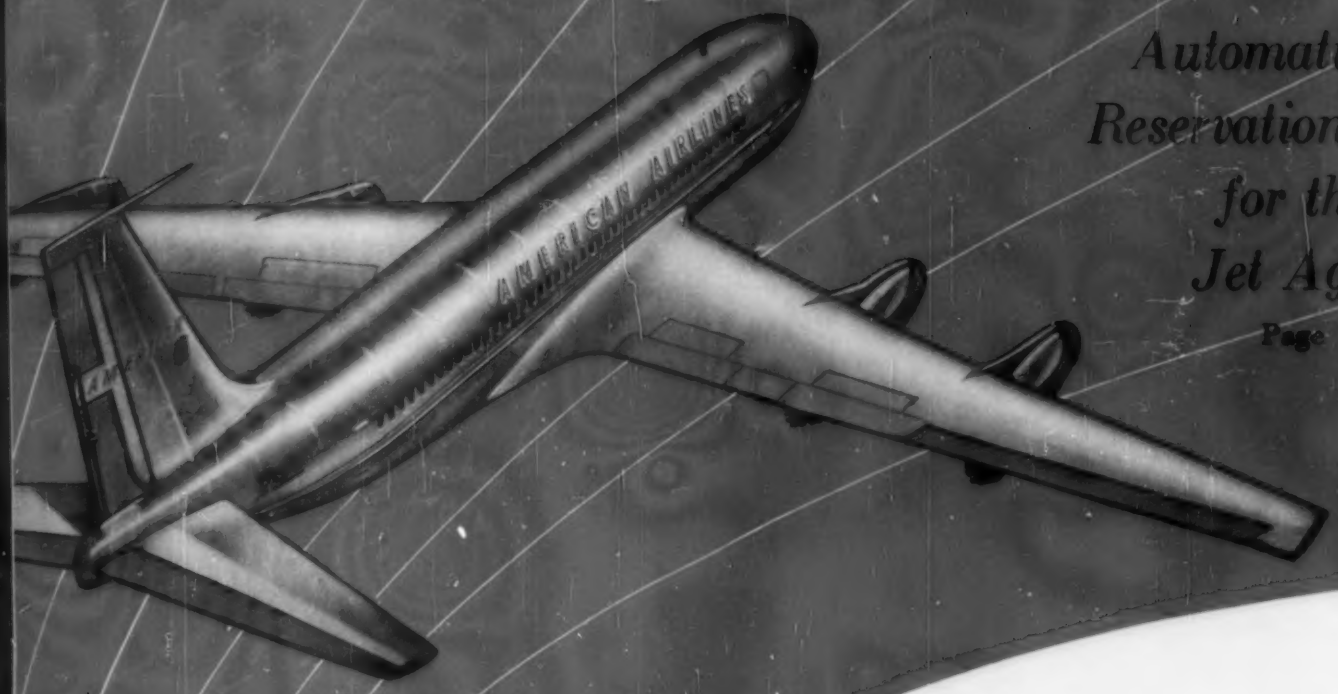
January, 1959

MANAGEMENT *and* BUSINESS AUTOMATION



Automatic Reservations for the Jet Age

Page 14

Microfilm Goes to Work

Page 19

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Feature subjects scheduled for 1959 issues

BUSINESS AUTOMATION IN GENERAL . . .

Social Aspects and Consequences
Union Attitudes
Regrooming the Executive Staff
Investment Factors
Training New Operating Personnel
Executive Control of Business Forms
The Executive's Role in Business Automation
Proper Housing of Equipment
Implications of Operations Research
Programming Problems
Electronic Communications
Business Automation Overseas

SPECIFIC BUSINESS OPERATIONS TO BE COVERED . . .

Order Writing
Payroll Accounting
General Accounting
Auditing
Budgeting
Invoicing and Billing
Accounts Receivable
Accounts Payable
Cost Accounting
Statistical Reporting
Forms Design and Control
Business Forecasting
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MANAGEMENT *and* BUSINESS AUTOMATION

January, 1959
Vol. 1, No. 1

Reporting to management on new ideas, developments, applications, results, and the human impact of office automation in all areas of commerce, industry and government.

14 American Airlines Automates Reservations For the Jet Age By Arnold E. Keller

Its huge data processing network operates around the clock to provide reservation service to eight million passengers.

19 Westinghouse Automates Engineering Drawings

More than a million tracings are "retired" as microfilm and punched cards take over at the East Pittsburgh Division.

27 Recorder Charts Machine Use

28 "Invoice Inside:" The Magic Of Push Button Inventory Control By Eugene Whitmore

Automation can end merchandise delays caused by paperwork confusion. The goal—an invoice with every shipment.

34 Nine Ways to Avoid a Headache

Planning a fool-proof, headache-proof home for automated equipment is a job for the experts.

37 TV as a Business Machine

38 You Can't Automate a "Mess"— First You Have to Get Organized By Harold Wood

Sometimes automation is just an additional burden. You can't add machines to a system that has already collapsed.

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Letters

Dear Sir:

You were good enough to forward me a copy of the Preview Edition of MANAGEMENT and BUSINESS AUTOMATION. I turned the pages until I reached page 8. The purpose and intention seemed logical.

Page 16 stopped me cold. I do not need to tell you what appeared on that page and on those immediately following. A magazine, hardly over the throes of birth, catering to the American business executive, attempting to sell the business executive a hoodlum who, by any and every illegal device known, gained a top position in a union which had been proven to be an enemy of business.

R. M. Ravenscroft
Vice President & Secretary
Bunte Brothers Chase
Candy Co.
Chicago, Ill.

■ *See editorial, Page 50—ED.*

Dear Sir:

In your October issue you have a very fine article entitled, "James Hoffa Eyes the Office Worker." I was very impressed with this article and would very much like to have some copies of it. I would appreciate receiving 20 reprints of the article and one copy of the magazine itself.

Frederick T. Burrill
Senior Vice President
California Federal Savings
and Loan Association
Los Angeles, Calif.

Dear Sir:

I enjoyed the October issue very much. Of particular interest was the article by Mr. Keller, "James Hoffa Eyes the Office Worker."

S. L. Stetson
Branch Manager
International Business
Machines Co.
Chicago, Ill.

Dear Sir:

Congratulations on your first edition of MANAGEMENT and BUSINESS AUTOMATION. I know it must be a thrill. I particularly enjoyed your first article, "James Hoffa Eyes the Office Worker." We have not had good information published recently about the status of office unions. I hope you can continue to meet the fine high standard which has been set in your October, 1958 Edition.

Irene Place
Associate Professor
University of Michigan
Ann Arbor, Mich.

Dear Sir:

Absolutely delighted with your story about our electronic data processing system at The First in the preview edition of your new magazine. I think everyone concerned did a wonderful job.

John W. Calkins
The First National Bank of Boston
Boston, Mass.

Dear Sir:

We believe this new outstanding publication certainly has outstanding merit, is most timely, and will be more than welcomed with open arms as well as open minds by every individual of modern thinking.

Allen E. Swenson
Vice President
Quest Manufacturing Co.
Chicago, Ill.

Dear Sir:

If all subsequent issues of your magazine continue to be as excellent as this preview copy, I am sure those of us connected with data processing will reap many benefits.

Arthur G. Bohne
Vice President
General Exchange
Insurance Corp
New York, N.Y.

Dear Sir:

This is a welcome addition to the literature in this field. Your objective of reporting on new ideas, developments, applications, results and the human impact of business automation in all areas is an admirable one, and one for which there is a great need. It is most commendable that you will also place emphasis on the economic and social aspects of automation.

John Diebold
John Diebold & Associates, Inc.
New York, N.Y.

Dear Sir:

Your editorial on Page 58 stakes out a large and problematic area which we in business automation often find more controversial than confusing. If I interpret your editorial correctly, you intend to alleviate or aid in the alleviation of some of these problems and controversies. Your success in adhering to the task laid out for yourselves in the editorial will benefit us very much and we would like to wish you every success.

Hayden E. Williams
Manager, Data Processing
General Electric Co.
Syracuse, N.Y.

Dear Sir:

I am pleased with the title of your new magazine, as it immediately states the relationship of systems as the vehicle of management. This relationship must be continually restated and thoroughly understood by all those who participate in any area of systems development, as well as those who carry the broader responsibilities of management, for they must rely on a smooth efficient flow of the data required for decision making.

Your further emphasis on "automation" as the prevailing trend in systems is reasonable in view of the history of administrative systems effort and the expected future

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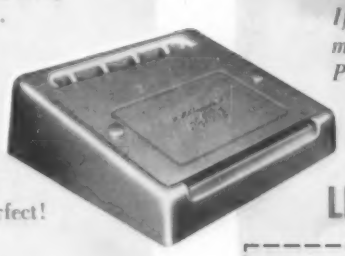

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course in this field. If your presentations recognize that automation in itself is not the panacea for all systems problems, and honestly consider the inherent limitations as well as the advantages involved in each case, you will place your magazine well above those current publications who have necessarily sacrificed authority in our field for the obvious advantages to be derived from a promotional approach.

Joseph A. MacQueen
President
Systems & Procedures
Association of America
Detroit, Mich.

Dear Sir:

I have just read the preview edition of MANAGEMENT and BUSINESS AUTOMATION and I feel that your magazine has the potential of fulfilling a need in management publications.

Roger L. Jorgensen
Los Angeles, Calif.

Dear Sir:

I was very favorably impressed with the article which appears in the preview edition of MANAGEMENT and BUSINESS AUTOMATION, entitled, "From Abacus to Electronic Computers." This article is a very good summary, which would make excellent reading for all new employes joining our organization. I wonder, therefore, whether permission may be granted for us to reproduce the article so we may make it part of the reading material turned over to new employes.

Albert E. Weller
Sales Promotion Manager
Autographic Business Forms, Inc.
South Hackensack, N. J.

Dear Sir:

The subject matter is interesting, sound, and varied, as befits the field you serve.

J. Howard Euston
Vice President
Business Research Corp.
Chicago, Ill.

Dear Sir:

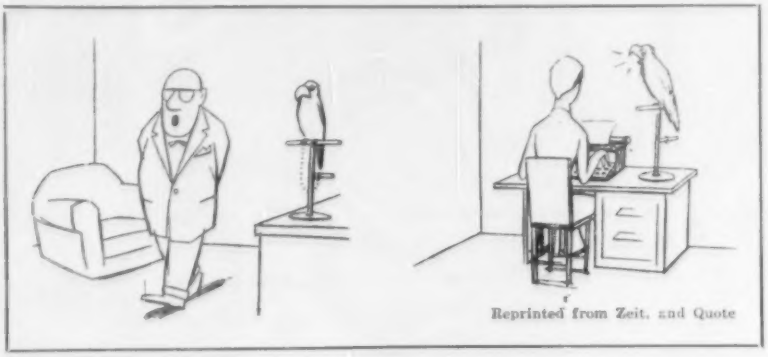
This letter is written to tell you how much I enjoyed the October preview edition of your magazine. I will look forward to receiving future copies of this magazine.

Richard R. Novotny
Secretary-Treasurer
Olympic Savings and
Loan Association
Berwyn, Ill.

Dear Sir:

Congratulations on your preview edition. I would like to obtain four additional copies of this issue if possible for distribution to others in our organization.

B. J. Sievers
Assistant Controller
The Lincoln Telephone
and Telegraph Co.
Lincoln, Nebr.



Reprinted from Zeit. and Quote

Dear Sir:

I was particularly amused at the cartoon by Art Huhta on Page 56. Would it be possible to secure your permission to reproduce this cartoon in one of our supervisory bulletins? I know we will find your magazine of interest to our EDP effort.

Richard A. Silver
Director, Personnel Service
Veterans Administration
Washington, D.C.

Dear Sir:

We have received the preview edition of your new publication. We feel that this will be an item that will be of value to us.

T. E. Whitesides
Assistant Vice President
San Francisco Federal Savings
and Loan Association
San Francisco, Calif.

Dear Sir:

You are in a position to render great service and become a great influence in this dynamic industry.

Harris Slotin
President
Electronic Business Systems
Savannah, Ga.

Dear Sir:

I enjoyed reading your October preview edition. I compliment you on a good start.

Edwin B. Moron
Executive Vice President
National Association of
Credit Management
New York, N.Y.

Dear Sir:

The very fact that a publication is being devoted to business automation will in itself tend to raise the status of the machine accountants.

Eugene A. Haessig
National Vice President
National Machine Accountants
Association
St. Louis, Mo.

Dear Sir:

Everyone in our office enjoyed the preview edition of MANAGEMENT and BUSINESS AUTOMATION and looks forward to reading future editions.

Helen J. Wood
Marketing Department
Stromberg-Carlson Co.
San Diego, Calif.

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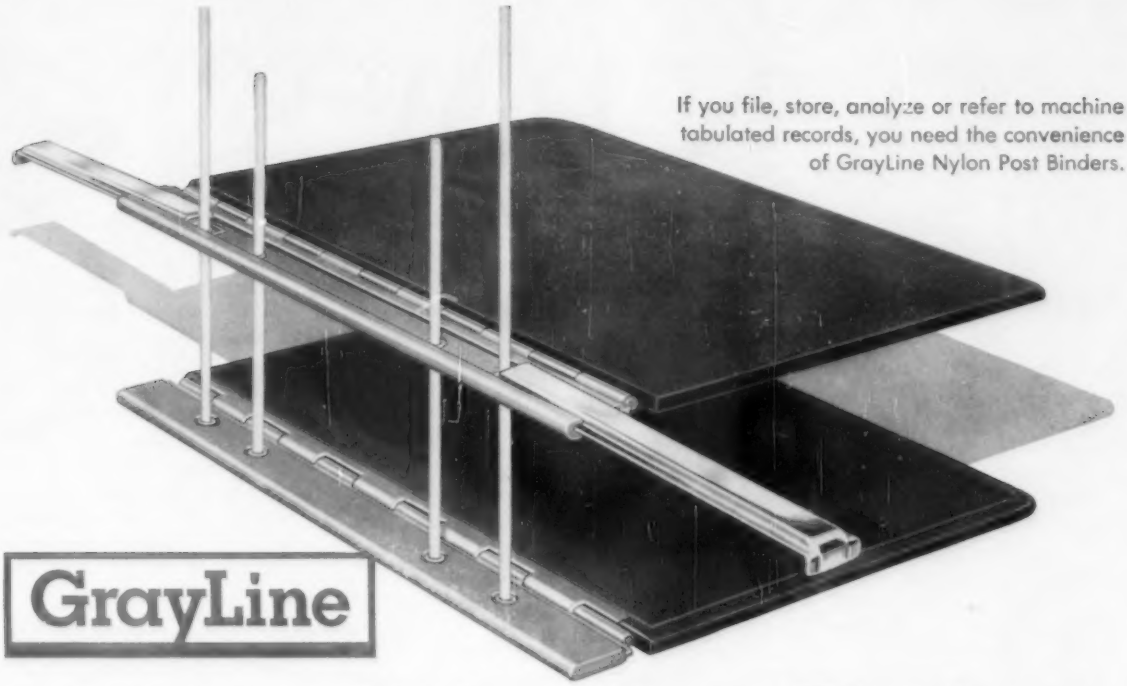

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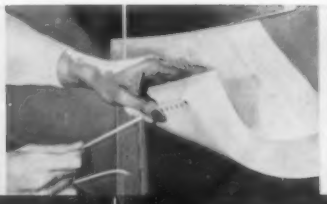

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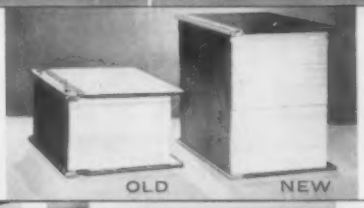

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NEWS

FGA Symposium on Business Automation

The Eighth Annual Symposium of the Federal Government Accountants Association, held in November at the Shoreham Hotel, Washington, D.C., attracted more than 1,200 registrants for the two day program on management and electronic data processing. According to the association's president, Harry J. Trainor, Assistant Commissioner of the Internal Revenue Department, the record attendance was evidence of the tremendous growing interest of government personnel in business automation.

Harry J. Trainor

He also pointed out that the government is the world's largest user of data processing equipment; that a large number of the symposium registrants were non-government people interested in the progress and problems of the installations of various government agencies.

The keynote address was given by Dr. Charles R. DeCarlo, manager of marketing and service, International Business Machines Corp. Dr. DeCarlo discussed "Management Impact with Respects to Integrated and Automatic Data Processing Systems." Kenneth C. Tiffany, vice president of finance, Burroughs Corp., talked on "The Economic Impact of Integrated and Automatic Data Processing Systems."

Other speakers, and their subjects were: Carl J. Knorr, vice president, Remington Rand Univac Division, and David V. Savidge, director of applications, Federal Government accounts, Remington Rand Univac Division, speaking on "The Development of Systems and the Application of ADP"; Thomas R. Bitterly, assistant manager of Electronic Machine Sales, The National Cash Register Co., who discussed "Arabic Magnetic Character Developments," and Dr. Roger H. Bender, assistant director of the Applications Department, Datamatic Division, Minneapolis Honeywell Corp., who spoke on "Profiting from Mistakes of the Past."

Ames Gets Computer For Space Research

A new computer recently installed at Ames Research Center in Moffettfield, Calif., is being used for space research and exploration. It is similar to the one used to keep track of the moon-probe rocket which traveled more than 79,000 miles into space following its successful launching by the Air Force at Cape Canaveral on October 11.

The research center is one of three government laboratories now operated by the newly established National Aeronautics and Space Administration created last July by Congress to coordinate civilian space flight projects and related aeronautical research.

One of the first tasks facing the IBM 704 computer is to assist Ames scientists in the search for improved methods of calculating precise paths of satellites successfully launched into orbit. Other studies will help engineers perfect the design of space vehicles and will focus on problems of re-entering the Earth's atmosphere.

An important goal in the computer program, said Dr. William A. Mersman, head of the center's electronic machine computing branch, is the development of comprehensive tables which will tell a space vehicle designer what materials are required to withstand the enormous temperatures created when vehicles traveling at rates of 18,000 miles per hour and beyond meet the resistance of the Earth's atmosphere.

Whitmore Named MBA Contributing Editor

Eugene Whitmore, veteran writer and editor in the business management field, has been appointed a contributing editor of MANAGEMENT and BUSINESS AUTOMATION.

Eugene Whitmore

Editor of American Business magazine for two decades, Whitmore is the author of such books as "Helping People Buy," "Building Your Business With Advertising," and "Office Furniture Merchandiser." With J. C. Aspley he wrote "Industrial Relations Handbook."

Whitmore was the first managing editor of Sales Management magazine. He has contributed to numerous business journals and to such consumer magazines as Saturday Evening Post, Look and Pageant.

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Lester E. Hill, NMAA President, Dies

Lester E. Hill, president of the National Machine Accountants Association, died last month in Wichita, Kan. He succumbed to a heart attack while en route from his home in San Diego, Calif. to St. Louis, Mo., for an executive meeting of the Association. He was fifty years old.

Chief of Tabulating for the Ryan Aeronautical Co., San Diego, Calif., since 1953, Mr. Hill had been active in data-processing administration and management for more than thirty years. He was elected to the office of NMAA president in June, 1958 after having served as Executive Vice President during the previous year. Prior to that he had served the association as a national director, vice president of research and development, and western division chairman of research and development. He had also served as president of the San Diego chapter, and before that, as treasurer of the Milwaukee chapter.

Mr. Hill is survived by his wife, Mary Jane, and a married daughter residing in San Francisco, Calif.

Lester E. Hill

Kallman Fills Post

Ronald J. R. Kallman

The newly created position of western regional manager for Philco Transac computer systems has been filled by Ronald J. R. Kallman.

Formerly with the Burroughs Corp., Electrodata Division, Sylvania Electric Co. and Massachusetts Institute of Technology Research Laboratory for Electronics, Kallman is now headquartered at Philco's Western Development Laboratory in Palo Alto, Calif.

From Watson to Watkins

In a modern business version of "David and Goliath," the tiny Simplex Time Recorder Co. (350 employes) has acquired the Time Equipment Division of International Business Machines Corp. According to President Curtis G. Watkins, the acquisition makes Simplex the largest exclusive manufacturer of time recording equipment and systems in the world. No purchase price for the IBM division was disclosed.

The Simplex Co., which is family-held, was founded in 1888 by Watkins' father, E. G. Watkins, in the small town of Gardner, Mass. (15,000). Manufacturing headquarters are still located in Gardner where the purchase was welcome news; the city has suffered some economic setbacks as a result of several key industries moving elsewhere. Announcing the acquisition at the City Hall Auditorium, Watkins said that the necessary expansion will mean the eventual addition of more than 500 skilled workers from the Gardner area and an increase in payrolls of $5 million yearly. More than 800 IBM sales managers and sales engineers are expected to combine with the Simplex staff, Watkins said.

IBM officials heard of the transfer from President T. J. Watson Jr., who spoke to executives in New York, Chicago and San Francisco via a closed circuit television broadcast. IBM products transferred to Simplex include time clocks, job recorders, master clock systems, central control systems, fire alarm equipment, and recorder door locks. IBM will continue the manufacture and sale of time equipment products outside the United States through the IBM World Trade Corp. The Data Processing Division of IBM will continue to manufacture the advanced 820 Time Punch. This machine automatically punches employee attendance time or job cost data into IBM cards at the sources of these operations, enabling the punched card records to be processed directly by machine accounting equipment.

New Division At Standard Register

Sales Planning, Public Relations and Special Activity departments at Standard Register Co. were recently merged into a new Advertising and Public Relations Division, according to President M. A. Spayd.

John F. Robinson

John F. Robinson, who has been serving as sales planning director, has been named director of the new division which will handle sales promotion and planning, advertising, public and community relations, employe-management communications, and publications and business show activities.

Three other assignments within the division include: the appointment of M. F. Hyer, former assistant director of sales planning to to director of sales promotion; John R. Drexler, former assistant to the director of public relations, to publicity manager, and Lou Rotterman former editor of publications and publicity to Special Activities Manager.

Fred Shaw Elected President of ARMA

H. W. (Fred) Shaw, administrator of the Kaiser Steel Corp. records control program, has been elected president of the American Records Management Association. Shaw previously served as first vice president. He was also a past president and charter member of the Records Management Association of Southern California.

W. W. (Fred) Shaw

Other newly-elected officers of the Association are: Ida Welch, Allen-Bradley Co., first vice president; Thomas E. Henzey, Cleveland Electric Illuminating Co., second vice president, and William Benedon, Lockhead Aircraft Corp., treasurer.

Pennsylvania Opens Computer Center

Pennsylvania recently became the first state in the nation to establish an electronic data processing center for all of its departments and agencies. A Remington Rand Univac electronic computer will process the state's information beginning with the Health Department payroll. In a year, the computer is expected to be used on 24-hour, three-shift basis. Governor George M. Leader estimated that its use for payroll processing alone will save Pennsylvania $300,000 a year.

"The decision to use this type of processing was not based on an attempt at experimentation," said Gov. Leader. "Numerous private businesses have successfully employed this same method of centralized computing for years with resultant great savings, and it was only after exhaustive studies of these business applications and specific proposals for its application here, that it was decided to install this computer." The State's Univac computer consists of 34 pieces of equipment, and is leased at a monthly cost of $25,000.

Stromberg Appoints General Manager

Dr. Donald G. Wilson was recently appointed general manager of Stromberg-Carlson's Electronic Division in San Diego, Calif.

He was formerly associate director of research and advanced development for the division. In his new position, Wilson will succeed Harold P. Field, who recently was named director of marketing.

U.S. Consultant To Head British Firm

Arnold D. Palley, Vice-President of Griffenhagen & Associates, management consultants in personnel, organization, and public administration, is now managing director of a Urwick-Diebold Ltd., new British firm specializing in automatic data processing and automation consulting.

Recent Appointments

Arthur D. Little Inc. — Milton M. Stone has joined the firm as a senior staff member heading data processing and information handling.

Soundscriber Corp. — Stanley C. Hope was elected president, succeeding William L. Less, who was named chairman of the board.

Litton Industries, Inc.—Maj. Gen. W. Preston Corderman (retired), former deputy chief signal officer for the U. S. Army, was elected a vice president.

International Telephone and Telegraph Corp.—William F. Boyd was appointed vice president of operations of the Kellogg Switchboard and Supply Co., communications division; Douglas M. Anderson was named director of manufacturing for central office equipment; Robert A. Nieminen, director of manufacturing for transmission and telephone; Richard M. Hultberg, manager of the electronic products division, and Ben E. Swanson, director of the newly formed systems engineering division.

Underwood Corp. — Leonard C. Bowen was named vice president of manufacturing, and George H. Nibbe was appointed president of the Canoga division.

International Business Machines Co.—Galen B. Baugher has been made director of personnel, Military Products Division.

Comptometer Corp.—Carl A. Zeller has been appointed manager of the Washington, D.C., sales office. New assistant sales manager of the firm is James G. Johnson.

Veeder-Root Inc. — Harvey L. Spaunburg was elected chairman of the board; Wilbur C. Stauble was elected president, and Andrew J. Rebman was elected to the board.

Addressograph-Multigraph Corp.—C. Edgar Smith, president of Towmotor Corp., was elected a director.

Magnetic Amplifiers, Inc.—Robert O. Baxter was appointed assistant treasurer.

Sure Brothers, Inc.—Harold J. Adler was named operations vice president.

Mayer and Dibrell and Co., Inc.—Robert S. A. Dougherty was appointed resident manager and Lindsey W. Teegarden was elected vice president and member of the board.

Royal McBee Corp. — John A. Young was named treasurer of Royal McBee International, a subsidiary.

Bruning Co. — Jack Johnson has been appointed executive vice president.

Smith-Corona Marchant, Inc.—Raymond Haney was appointed assistant to the director of product planning.

Stromberg-Carlson — Clarence A. Wetherill has been appointed chief engineer and Roy Richart, assistant chief engineer, San Diego Division; Jack Rosenberg has been named manager of engineering for Electronic Control Systems, Electronics Division.

Office Equipment Manufacturers Institute—Fortune P. Ryan, executive vice president of Royal McBee Corp., has been elected president of the Institute.

Hoffman Electronics Corp.—Ray B. Cox was appointed vice president and general manager of the consumer products division.

The nation's biggest airline is first to automate reservation handling. Its huge data processing network operates around the clock, providing Jet Age service to eight million passengers.

American Airlines Automates Reservations For the Jet Age

By Arnold E. Keller

WHEN AMERICAN Airlines' Boeing 707 Flagships zoom skyward next month to inaugurate jet service in the United States, the event will see automation playing a vital role in the Jet Age. As the huge Flagship cruises from coast to coast at 600 miles an hour, its payload of 112 passengers will relax in living room comfort, probably unaware of the complex automated reservation system operating far below the radar-guided skyways.

This system is part of a $400 million commitment for new equipment and facilities by American, the nation's largest airline, in its bid for leadership in U. S. commercial jet travel. The nationwide automatic reservation system is designed to provide "jet efficiency" for American's entire passenger service program. Two special types of electronic equipment, the Magnetronic Reservisor and the Data Organizing Translator, will perform major functions in the new system which will handle reservations and ticket sales for American's eight or more million passengers a year.

The Reservisor can give an instantaneous answer to any request about available flight space or schedules. The Data Organizing Translator is capable of organizing all of the complex information on an airline reservation card into a correct message form and then automatically routing the information to the proper sources. For example, a transatlantic inquiry from Lisbon, Portugal to New York, 3,500 miles away, concerning a flight from New York to Los Angeles, can be answered by the system in four seconds. The Reservisor in New York makes the reservation, and, at the same time, automatically subtracts one seat from the inventory retained on its "memory drum." Simultaneously, a Teletype in Lisbon transmits the name, address and other pertinent information about the passenger to New York over the same communication channel.

But reservations at American were not always so easy to handle. The beginning of a "system" for ticket reservations dates back to the 1940's when the airline first realized that its method of taking reservations had not kept up with its tremendous progress in aircraft design and in-flight service. Ever since April, 1926, when a young flier named Charles A. Lindbergh took off from Chicago for St. Louis on the first scheduled flight, American had made great strides in shrinking travel time. In 1931 it took three days to fly from New York to Los Angeles. By 1934 it was possible to make

American's President C. R. Smith: "Only through adroit use of automation will we be able to provide superior service to tomorrow's turbine travelers. Jets mean more speed, more passengers, more demands for service. Adaptation of automation to the needs of the airline industry in the United States reached a significant plateau in 1958. Most major airlines have installed various computers and automation devices to help them meet the increasing workload in reservations, cost control, and finance."

American's president, C. R. Smith

the trip in 21 hours. (Today the distance can be covered in eight hours, and a few weeks from now, in less than five hours.)

But the reservation system in 1940 showed none of this progress; instead, it dated back to the Lindbergh era. Recognizing the need for something substantially different, or at least more advanced than anything serving the industry at the time, American authorized its Advanced Process Research Department to analyse the existing system and define the problem. Results of the study showed that making a reservation involved three steps: determining the availability of space, adjusting the inventory, and recording the names of individuals involved. Of the three, the airline decided to give immediate attention to availability and inventory control. In airline parlance, availability refers to the status of space on a particular flight—Is there space available, and on what flight? This is important because space is the airline's "product," a product which is termed "highly perishable," for an empty seat on a plane which has departed can never be reclaimed. American's problem is like the one confronting many retail and distribution organizations which deal with large inventories of relatively high unit value. If the people merchandising the products are not at complete liberty to close the sale, business is likely to be lost. To so equip the sales person would mean posting up-to-date information on inventory levels for each items in stock—or in a looser system, it would entail the maintenance of surplus stock as a hedge against overcommitment. The latter method is expensive for any business, and would be next to impossible in airline transportation. Because of the extreme perishability of the product, it is imperative that American Airlines personnel be provided rapid quotation on the reservations which were for sale, and equally important that they be able to register customer purchases instantly at a central control point.

When a ticket is returned, or a reservation cancelled, there must be a fast and accurate way to process that fact. A valuable item of stock has been returned to inventory, is available for resale, and must be sold. If a seat is unoccupied at airline departure time, it suffers a 100 percent mark down.

Existing methods for accomplishing these objectives were anything but satisfactory. Generally they consisted of some sort of availability book, or ledger, and a visual display board. Of the two methods, the availability book was the least successful. While the book provided the agents with information at their fingertips in easy-to-read style, its use was naturally limited to just a few agents at any one time. Multiple books only complicated an already serious problem. Delays, errors and negligence in keeping all the various copies up-to-date added to the confusion.

Nine ways to improve

The display board allowed many agents to view a common source of information, but was limited in the number of people it would conveniently serve. Then came multiple boards—and the same problems encountered in the use of multiple books. Efforts at solution resulted in a great deal of experimentation with improved visual display boards and as a result, there were probably as many different approaches as there were stations using the boards. Some attempts were even made to electrify these boards, but the cost was high. The problem was very much like a parody of the old arithmetic teaser: "If it takes one man ten minutes to do a sum on an adding machine, how many men will be required to do the same sum in ten seconds?" Just putting more men in the job was not the answer to faster and more efficient operation, instead, a new method was needed.

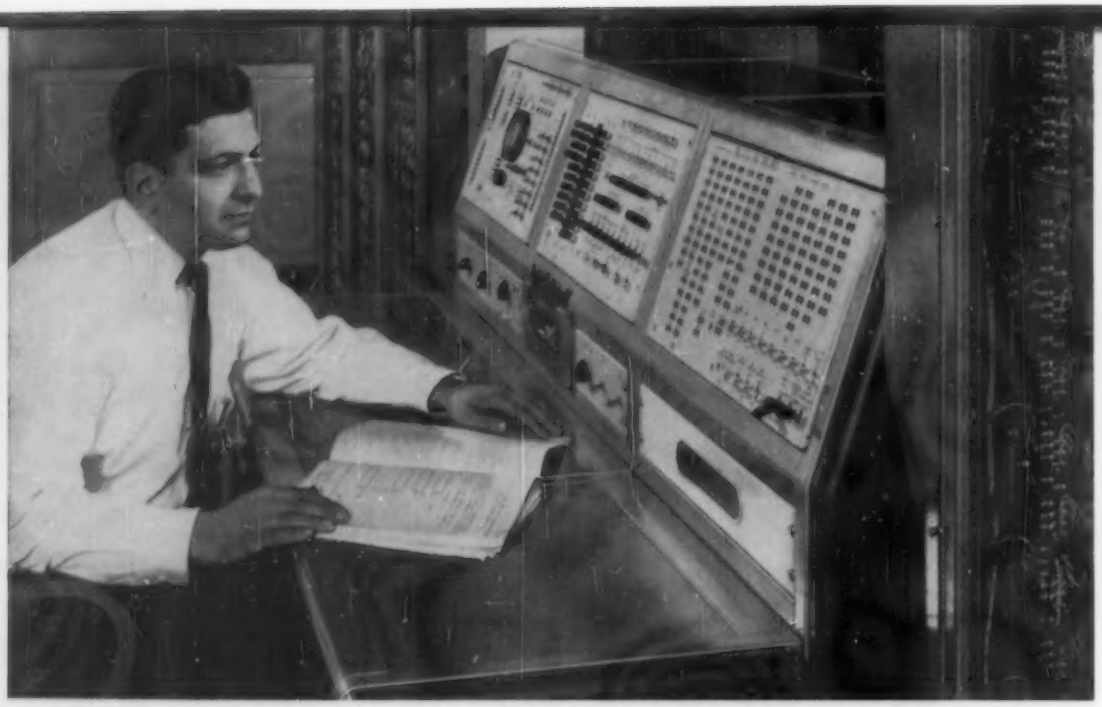
American's reservation agents put ticket information on punched card forms; agents' key sets are linked to **Magnetronic Reservisor for constant** updating of seat inventory.

The research group outlined requirements for an "ideal" system. They felt it should:

1. Provide availability, making space immediately available to the agents so it could be sold.
2. Record sales and cancellations as they occurred. Obviously, the earlier a cancellation was recorded, the better chance there would be of reselling the space.
3. Reduce the airline's dependance on a large auditorium-like area for future reservations offices.
4. Make available to ticket offices, travel agencies, or to any point all the information in the main reservation office.
5. Disseminate flight information quickly and accurately, and give the same answers to identical questions.
6. Give the load room, the caterer and the flight dispatch office an up-to-the-minute load count at anytime it is needed.
7. Automatically advise downline stations when a flight has been sold out.
8. Keep an accurate running inventory.
9. Allow for accepting and processing passengers for boarding at points other than the airport gate. A comparatively high percentage of passengers in cities leave from centralized points within the city. By processing these people in advance, the delay time at the airport gate would be reduced considerably and many last minute crises averted.

Summed up, the basic problem was to provide an easy way for many agents to have rapid access

Data transceivers create punched card tickets at 500 an hour; link key cities like New York, Chicago and L. A.



The Magnetronic Reservisor, "brain" of the automated reservation system, takes a two-hour "service break" every 24 hours. A maintenance man takes over the console for this period, the only time the unit is supervised.

to the number of seats available on all flights at all times. Since the success of any system would depend upon its accuracy and reliability, the research group decided that some sort of automatic equipment was the answer.

Marbles and memories

American's first approach was to go to the large manufacturers and see if any equipment was available which would meet their requirements. It soon became obvious that ordinary accounting system equipment would not do the job. Nor did there seem to be any particular interest among the manufacturers in developing new machines that would do the job. So the research group took matters into their own hands and decided to design the system themselves.

Their first attempt looked something like a "Rube Goldberg" creation, but it worked, and it gave the group a better understanding of the problem. The system consisted of vertical metal tubes representing flights on a particular day, with marbles to designate seat availability. An electric trip at the bottom of each tube released a marble for each seat sold. Marbles could be returned from the top to represent seats cancelled. A quick glance at the number of marbles in the tubes would give the number of seats in inventory. Numerous other ideas and experiments followed the marble machine. Finally, in the basement workshop of one of the research group members, a system was designed that was ultimately to become the Magnetronic Reservisor, A matrix, similar in design to the core memories used in some computers, contained vertical and horizontal rows representing dates, seats, and flights. As a seat was sold, a jack plug was inserted which closed a circuit. When all seats for a given flight and date were sold the machine would transmit a signal to that effect. The homemade working model was demonstrated to members of American's top management in 1944. They approved the approach and established a fund to further the idea.

Later that year the Teleregister Corp. examined the crude working model and agreed to produce a pilot model at a reasonable price. Installed at Boston, in February, 1946, it was designed strictly for availability. The system provided remote controls so that agents could interrogate the machine and receive immediate replies as to whether a flight was sold out or had seats available. First year results found some 200 more passengers per day being accommodated by the Boston operation while at the same time, the office force was reduced by twenty. Passenger agents were enthusiastic about the system. In fact, they quickly named the system "Girly," because it "told all."

Electronic perfection

While the Boston installation seemed to solve the availability problem, it was still necessary to improve the equipment so that inventory could be handled. Again American's research team and Teleregister combined talents and in 1952, came up with the Magnetronic Reservisor. The machine, a random access magnetic memory drum com-

Continued on page 31

Punched cards with microfilm mounting are fed automatically into the Copyflo printer which turns out enlarged prints up to 24 inches wide, at the rate of twenty linear feet a minute.

WESTINGHOUSE Automates Engineering Drawings

More than a million engineering tracings are 'retired' as microfilm and punched cards take over at Westinghouse's East Pittsburgh Division.

SAVINGS of $125,000 in preparing engineering drawings and a 10,500 square foot reduction in floor space are the dramatic first-year results of Westinghouse Electric's decision to automate engineering drawings in its East Pittsburgh division. And top company officials predict that the firm will realize savings of $360,000 a year when the entire system is in operation.

So far, drafting expenses alone have dropped $48,000 annually because Westinghouse has switched from cloth to paper in its engineering drawings. And, the corporation reports an increase in the efficiency of its engineering department because the new microfilming system has greatly reduced the time it takes for an engineer to obtain a particular drawing from the file.

Many companies use microfilm drawings for security reasons or to reduce the space taken up by inactive or obsolete documents. But Westinghouse is one of the first large industrial firms to auto-

Executive Vice President J. K. Hodnette, Jr., President Mark W. Cresap, and Vice President of Apparatus Products A. C. Monteith approve the mock-up of the automated drawing department.

mate its engineering drawings by this method.

"We have put our microfilm to work," says Tom New, manager of the Office Systems and Service Department for the East Pittsburgh Division. "We have retired, for all practical purposes, the engineering tracing. It is now used mainly as a master from which a microfilm record can be made."

The East Pittsburgh Division is spread over nearly 250 acres in Turtle Creek Valley, about 12 miles from downtown Pittsburgh. More than 15,000 persons share in the manufacture of large motors, tremendous water wheel and steam turbine generators, power circuit breakers and other power and switchgear equipment ranging from small massed produced units to million dollar custom installations.

Because of the diversity of its products, the Division has seven engineering departments employing hundreds of engineers and some 400 draftsmen who are actively engaged in creating new or revised drawings. Each year more than 30,000 new drawings are prepared and better than 54,000 drawings revised. Before the idea for the new system was born, more than 3,000 requests for copies of engineering tracings were processed daily, which amounted to twenty million square feet of paper a year. This gigantic volume of paperwork was a major factor behind the firm's decision to install an automated engineering drawing system. Initial impetus for the system came out of an October, 1957 meeting of the Technical Drawings Associates, at which the East Pittsburgh Division was host.

Technical Drawings Associates is a group of top drafting and engineering personnel with engineering and drafting department responsibilities. Founded in 1930, the group's membership represents a cross-section of large industrial, engineering, and public utility firms and educational institutions. Members meet once a year to discuss problems of mutual interest.

The Westinghouse delegation, headed by Tom New, recognized the tremendous potential in applying automation to their engineering drawing procedures. They were also aware that Westinghouse would be a pioneer in this undertaking. Minutes and notes of the Associates meeting

Precision microfilm camera makes exposures of original drawings in a few seconds. The camera is located on the first floor to eliminate excessive floor vibrations.

quickly found their way to top management. In a few days, L. B. McCully, vice president and general manager of the East Pittsburgh Division authorized a "go-ahead" on the project. Other members of top management were quick to give their approval. On November 4, just two weeks after original presentation of the proposal, Westinghouse was under way on a project that was hailed as one of the most far reaching decisions in the history of the corporation—a project that might well have a significant influence on the entire American industrial community.

Management's approval did not immediately put the revolutionary system into operation. There were many questions to be answered, pieces of equipment to be surveyed, and complex problems to be solved. Obviously, no one person within the corporation could be expected to anticipate or answer all of the problems that would arise. So the first direct step was to form a guidance committee. Management was well aware that the average committee assignment would mean many weeks of slow, foot dragging speed with little actual progress. To prevent this from happening, they gave the committee just three weeks to make preliminary studies and to decide whether an automated drawing system was feasible. Specifically, the committee was charged with the following:

1. Review all the equipment available in the drawing processing field, with particular emphasis on microfilming equipment.
2. Review present operations in the drafting and processing sections of the East Pittsburgh Division.
3. Plan a pilot line storage and reproduction system for early installation.
4. Plan one or more drawing processing

systems which would meet the needs of the East Pittsburgh Division and present them to management with the necessary data for evaluation.

Members of the committee, who were primarily systems people, were assisted by the Drafting Practice Committee which was made up of senior supervisors from the drafting offices who were responsible for preparing original engineering drawings. Their aid in developing the new system was invaluable, for the success of an automated drawing system would depend considerably on the quality of the initial drawings.

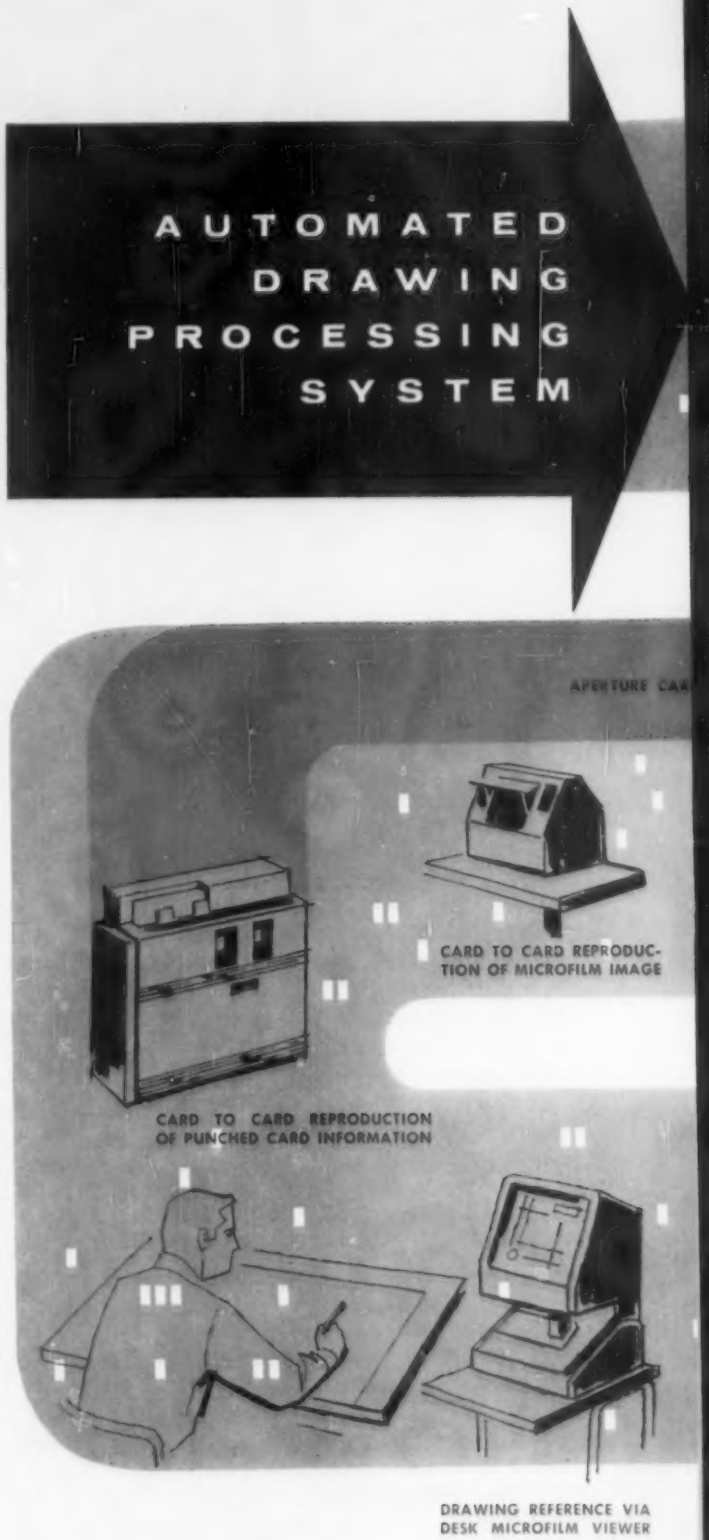
The committee survey showed that there were already many users of the combination microfilm-tabulating card, now widely known as the aperture card. Police departments, hospitals, insurance companies, banks and many other business institutions were using such cards. But few industrial organizations had put them to work. In most cases they were using the cards for security filing purposes.

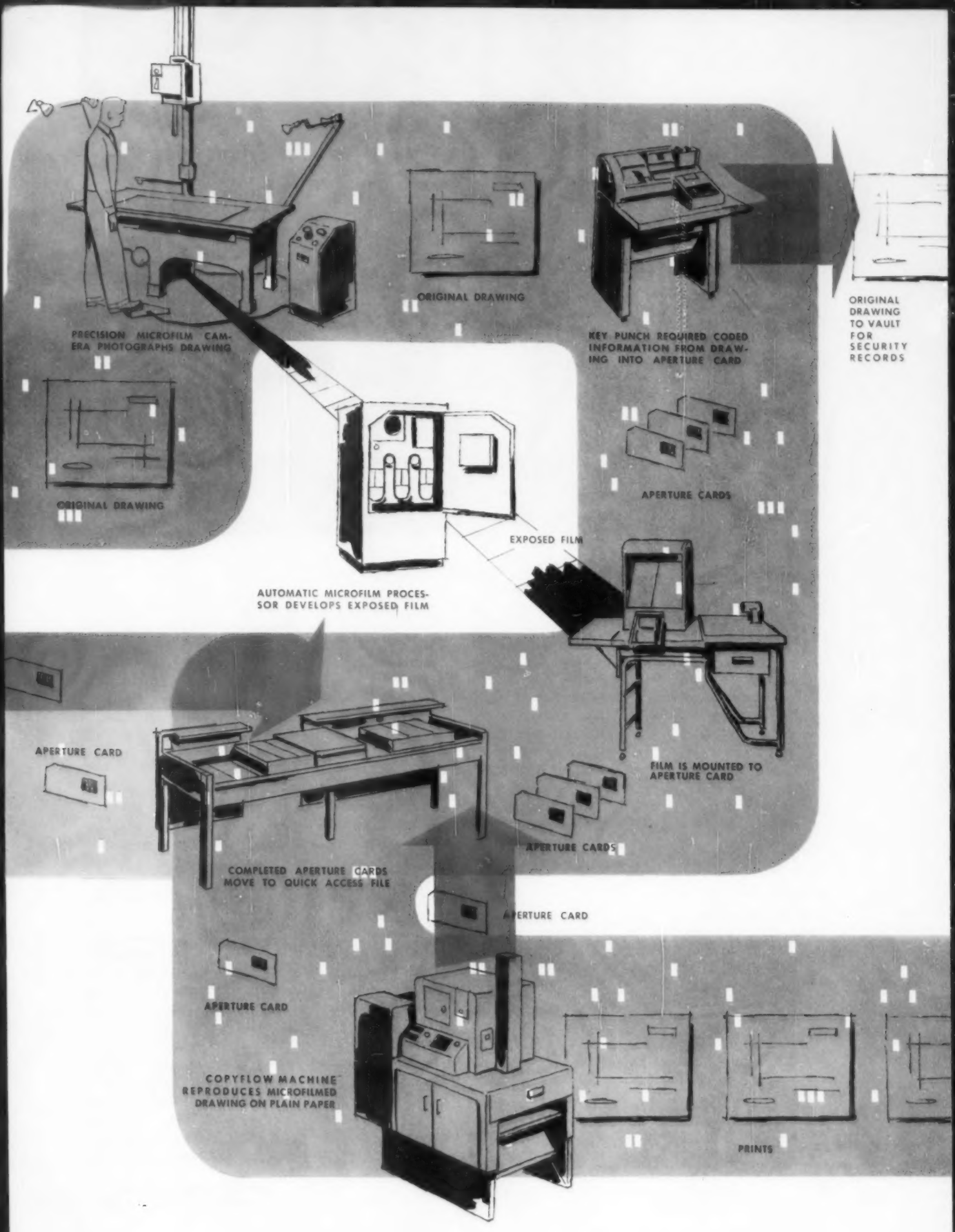
Full speed and a bonus

These findings were submitted to management well within the established time limit. The report enthusiastically supported the installation of an extensive automated drawing system. Though time did not permit a detailed financial study, every indication was that the installation would pay for itself within a few years. Management accepted the report and emphasized that the new system should be installed as quickly as possible.

The first step was a thorough study of the existing operations by the committee. Facts and figures concerning the number of tracings, size of tracings, work loads, existing equipment and other pertinent information were gathered and recorded as a foundation on which to build the new automated system. The study was completed early in January, 1958. At that time meetings were arranged with representatives of the various departments that would be involved in the operation to explain the possible advantages and economies of the proposed system. The project was received with enthusiasm in all areas of the firm. The Power Circuit Breaker Department was so sold on the idea that they announced they would expect the automated drawing system to be completed and installed in their new headquarters building which would be finished in early 1959.

An unexpected bonus from the proposed system was brought to light during a discussion of this department's impending move to the new location. The department had already started to manually review thousands of tracings in the drawings vault to determine which ones to move to the new area. This time consuming operation was stopped




PRECISION MICROFILM CAMERA PHOTOGRAPHS DRAWING
ORIGINAL DRAWING
ORIGINAL DRAWING
KEY PUNCH REQUIRED CODED INFORMATION FROM DRAWING INTO APERTURE CARD
ORIGINAL DRAWING TO VAULT FOR SECURITY RECORDS
APERTURE CARDS
EXPOSED FILM
AUTOMATIC MICROFILM PROCESSOR DEVELOPS EXPOSED FILM
APERTURE CARD
FILM IS MOUNTED TO APERTURE CARD
APERTURE CARDS
COMPLETED APERTURE CARDS MOVE TO QUICK ACCESS FILE
APERTURE CARD
APERTURE CARD
COPYFLOW MACHINE REPRODUCES MICROFILMED DRAWING ON PLAIN PAPER
PRINTS

Negatives are mounted in punched cards by a simple press of a lever. An operator checks the number of the drawing through a viewer to be certain that the film matches the coded information punched in the card. More than thirty cards can be mounted in a minute.

when the firm realized that once all drawings were converted to aperture cards, the job could be done mechanically.

The next step for the committee was to call in the men who sold equipment which could be used in the proposed system. In many cases local salesmen were asked to see to it that both regional and factory representatives attended these conferences. As one Westinghouse official expressed it, "We have learned by experience that delivery and service are just as important as price quotations, and when you are trying to install a new process or system, nothing can create chaos as easily and as quickly as a supplier who can't, or won't, live up to his salesman's promises."

A good deal in cards

After numerous meetings with various suppliers, the committee became even more confident that the automated drawing system was not only feasible, but would be a tremendous success. The system they visualized hinged on three major developments:

1. Recent improvements in the quality of microfilm.
2. Supplies and equipment which made it possible to economically mount 35mm films on tabulating cards.
3. Development of continuous electrostatic printers which could use aperture cards to make paper copies.

A pictorial flow chart of the proposed system (see page 22) was presented to management with a second report outlining the advantages of the proposed system. The report pointed out that the company would save $125,000 in operating costs and 10,500 square feet of space during the first year of operation, with still other advantages forthcoming. The microfilm would provide continued availability of drawings while the original tracings were out of file for sub changes. This would prove particularly useful in the case of standard drawings where a number of parts or assemblies appear on one drawing. Another advantage—it would take much less time to prepare prints with a flexible punched card system for filing and refiling, instead of the standard cumbersome operation associated with the pulling and refiling of full-sized tracings.

Another plus factor of the proposed system was its ability to code the aperture cards by product and type of assembly and key punch this information into the card to provide a simple, flexible, and mechanical method of reference. This was a considerable improvement over previous methods in which engineers, draftsmen, tool designers and other technical personnel maintained "little black books" and other personal records on previous designs, supersedures and other information necessary to their operation.

With the full implications of the new system before them, management returned a complete

Tom New, manager of office systems and services, spearheaded new system; also heads Univac and IBM operations at East Pittsburgh.

vote of confidence. Actual installation got under way in February—just three months after the preliminary survey had been made.

The new system went into operation in June. It begins with an original engineering drawing, on paper rather than cloth, completed and approved by the Engineering Department. Use of paper is possible because handling of the original drawings is now kept to a minimum. Actually, the original is used for just one purpose—to prepare the aperture card. Drawings are arranged by size. The drawing number, sub number, and product code are listed on a sheet which is forwarded with the drawings to the Reproduction Department for microfilming.

Pictures with precision

Automation of the reproduction system has brought about enforcement of certain drafting standards. Draftsmen are constantly reminded to think in terms of microfilming. Standardization of such things as pencil hardness, work surfaces, line widths and many other points which effect the quality of reproduction are constantly emphasized. Actually, the new system does not require any unusual drafting practices. It merely requires that draftsmen adhere to the principles which appear in most drafting manuals, but, through laxity, are not rigidly enforced.

Since a duplicate set of aperture cards are used in the system it is necessary to make two exposures of each drawing. The camera used is a Model C-3 Microfilm Camera, a product of the Recordak Corp. Drawings are filmed in a matter of seconds. Reductions vary according to the size of the tracing, and in the case of the largest drawings (28 x 40 inches), are as small as 30 to 1. Exposure must be so precise that even vibrations in the floor are critical. At Westinghouse it was necessary to locate the microfilm camera on the first floor of a building in order to eliminate these excessive vibrations.

Filmsort cards are housed in automated files; clerks can glide to file positions. The master file now has 50,000 cards, with half a million expected by 1960.

The microfilming operation requires much care and precision. Camera operators are required to check their light meters and camera settings with regularity. Densitometers must be employed to insure uniform density of the microfilm. After the drawings are filmed they are sent to the security vault where they remain until the original is changed. When this occurs they are removed from the vault, revised, microfilmed again, and returned to the vault.

Processing film after exposure is all important. Each operation requires precision and exact tem-

Continued on page 47

AMERICA ALWAYS OUTPERFORMS ITS PROMISES

We grow so fast our goals are exceeded soon after they are set!

7 BIG REASONS FOR CONFIDENCE IN AMERICA'S FUTURE

1. More People—Four million babies yearly. U. S. population has *doubled* in last 50 years! And our prosperity curve has always followed our population curve.

2. More Jobs—Though employment in some areas has fallen off, there are 15 million more jobs than in 1939—and there will be *22 million more* in 1975 than today.

3. More Income—Family income after taxes is at an all-time high of $5300—is expected to pass $7000 by 1975.

4. More Production—U.S. production *doubles* every 20 years. We will require millions more people to make, sell and distribute our products.

5. More Savings—Individual savings are at highest level ever—*$340 billion*—a record amount available for spending.

6. More Research—*$10 billion* spent each year will pay off in more jobs, better living, whole new industries.

7. More Needs—In the next few years we will need more than *$500 billion* worth of schools, highways, homes, durable equipment. Meeting these needs will create new opportunities for everyone.

Add them up and you have the makings of another big upswing. Wise planners, builders and buyers will act *now* to get ready for it.

FREE! Send for this new 24-page illustrated booklet, "Your Great Future in a Growing America." Every American should know these facts. Drop a post card today to: THE ADVERTISING COUNCIL, Box 10, Midtown Station, New York 18, N. Y.

An MBA Product Preview

Recorder Charts Machine Use

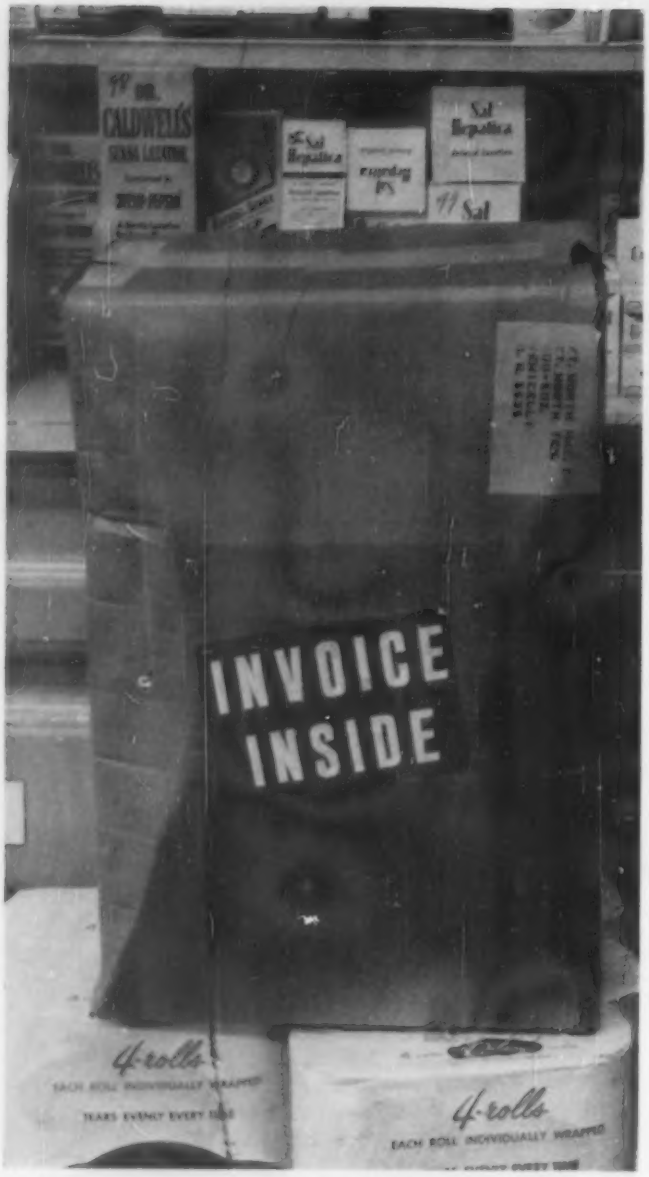
The Bar Chart Recorder provides an automatic record of machine utilization.

MANAGEMENT can now have up-to-the-minute control over the utilization of data processing equipment. The Bar Chart Recorder, a new development from the laboratories of Gorrell and Gorrell, Westwood, New Jersey, will provide minute-by-minute recording of machine utilization for as many as forty machines on one continuous bar graph. The Recorder, operating remotely from the data processing center, can provide management with the accurate picture of each machine's productive and non-productive effort. It can also provide additional information, such as the operator number, job and shift number, without any manual effort on the part of the machine operator.

The Recorder automatically shows the actual distribution of machine and operator time. It portrays this information on a single chart—essential for a quick grasp and instant understanding of machine utilization. It pin-points lost time due to machine breakdown. Its graphic time distribution patterns can tell an important story of idle machine time because of poor scheduling, excess equipment, too long coffee breaks, tardiness in starting, delays in returning from lunch—all important factors in the efficient operation of a data processing installation.

Basic units of the Bar Chart Recorder are a rotating drum carrying an inkless chart and a stylus, or writing point. The Recorder is connected to the machine by telephone-like wire. The machines to be monitored require a small transformer, about the size of a cigarette pack, which requires only five minutes to install. For twenty seconds every two minutes, the Recorder "samples" each machine, and, if the machine is operating, records the fact on the chart with a short horizontal line in the appropriate "bar" area. The lines do not appear if the monitored machine is idle. The stylus also records the time, heavy lines representing hours and thinner lines indicating minute intervals. The chart itself has a snow white wax coating with the brilliant red color showing through only where the stylus has so scribed to produce the bars. The chart is waterproof and permanent.

Recorders are available in two models. The "S" model has a capacity of monitoring 2 to 20 machines at once, at a rate of sampling of every 2 minutes for an eight hour shift. The chart produced by the "S" model is 6 by 13 inches and the cost of the machine is approximately $450. The larger "M" model has a capacity of 40 different channels and operates at six times the speed of the "S" model. It is capable of recording utilization for forty machines on a 24-hour shift at a sampling rate of once per minute per machine. Where desired, the "M" Recorder can be used to record a full week on its 12 by 20 inch chart. Up to forty different machines can be monitored continuously throughout the entire week. The "M" model sells for $750. ■



An invoice with every shipment—one of the many benefits of business automation.

'Invoice Inside': The Magic Of Push Button Inventory Control

Automation can end costly merchandise delays caused by paperwork confusion.

By Eugene Whitmore

IN MID-OCTOBER, 1958, copper prices advanced. Aaron and Co., New Jersey plumbing supply wholesaler, got a price-advance notice at the same time as other wholesalers. Within minutes, Aaron and Co.'s "push-button" inventory control and sales record system was called on to produce a list of all customers buying copper tubing. With this data before him, Sales Manager Alan Silver telephoned each of the company's salesmen via the office-to-salesmen short-wave radio telephone hook-up in Aaron's New Brunswick office.

"See these buyers quick as possible and line up their orders for copper before the price advance takes effect," Silver told his men. A day or two later, every important buyer on Aaron's customer list had been visited or telephoned. Many orders for copper were booked. When competitors got around to ask for copper orders, dealers said, "We've bought from Aaron." Push-button sales analysis and inventory control, plus short-wave radio phone service, enabled a small wholesaler to capture a huge volume of sales while competitors were getting their "ducks in a row." Not having modern record equipment thus cost competitors a pretty profit.

Today's margin for error is so narrow, few companies can survive the mistakes and delays

once shrugged off as inevitable "fortunes of war." Mistakes in buying and in market estimates, cost miscalculations, delays due to inadequate records, and paper work delays due to obsolete equipment mean that a business cannot compete against companies that do not tolerate such errors and delays.

No sale

A New York coat manufacturer sold 300 dozen coats to a large department store in 1957. Delivery was a "must" for November 15. The store buyer planned a promotion around these coats, prepared advertising, and alerted his sales people, warning them this was a truly wheeler-dealer purchase. However, the manufacturer was bogged down in paper work—purchase orders for material, trimmings and buttons; quantity calculations of items; preparation of work tickets, of piece-work records and getting the work into production. The shipment went out late; it arrived at the store's receiving dock on November 17, two days late. In the store's mid-November pandemonium of Christmas merchandise arriving every few minutes and buyers screaming, shipments two days late were dead ducks. The 300 dozen coats were sidetracked for merchandise scheduled to arrive—and arriving—on November 17.

Meanwhile, the store buyer frantically called the manufacturer who in turn called his truck lines. Everyone passed the buck, because no one had kept records. On December 26 the store returned the 300 dozen coats. The manufacturer dumped the coats on a discount operator for three dollars each, and incurred losses which brought him near bankruptcy. This coat maker is now experimenting with a computer installation. He hopes it will speed calculations, facilitate materials ordering, shorten production estimation and produce other aids for getting orders shipped on schedule. Formerly, one would have worried little about a two-day-late shipment. Today, one merchandising event follows another, promotions are time-tabled to a minute-by-minute precision. Little margin for error exists.

In the summer of 1958 a pen manufacturer released a powerful school-opening promotion with sample pens for teachers, store displays and other materials. Dealers bought heavily. But some did not receive pens until three weeks after school opened. Result: the partial failure of a brilliantly-conceived sales project. The margin for error was whittled uncomfortably close. One reason for these costly mistakes is failure to coordinate and set up time-tables to insure that activities of every department involved will mesh with those of other departments. Rough estimates are no longer adequate. Automated and accurate calculations are needed. Today, new products (or new packaging for old products) follow one another with dazzling speed in many industries. So "coordination" is the operative word in new product introduction.

Endless calculation and data processing are needed in sales estimates, purchases of new materials and of parts, of packages, labels, cartons, containers, each with its own special requirements for lead time. Factory orders must be prepared and processed, and accurate estimates of production capacity made, particularly on new processes or routines for which previous experience is not on tap. Raw materials, parts, packages, labels, cartons should arrive in proper sequence, and drawings, instructions, specifications, other paper work (often requiring quantity duplication) must be done on schedule.

Without automation, disaster looms. Computers and data-processing systems have enabled many companies to score a win with a new product, style or color before competitors got off the ground. Costly errors occur when coordination fails. One observer states that too many business organizations are "compartmented" — departments are isolated, have faulty liaison with other departments. One compartmented operation can hold up an important project because "the figures aren't in yet." Or a department grossly misjudging its speed, capacity or the need for meshing with other departments can similarly drop a monkey wrench into the machinery. Compartmentation also occurs when one department, which uses automated equipment, finds its work delayed and hampered by related departments still using antiquated methods.

Discount and discontent

A large corporation with one of the country's fastest-selling cosmetic lines has employed aggressive advertising and selling which put it ahead of older competitors. Yet the company's billing and invoicing procedures are causing merchants to complain bitterly. Shipments arrive minus invoices. And until the invoices arrive, goods cannot be priced and put in stock. Often the 10-day discount period expires before invoices arrive. One customer reports that twice he has decided to abandon the line because of arguments over this 10-day two-per-cent discount. Another customer reports the company returned a check, demanding an additional fifty cents which had been deducted as cash discount. The invoice had arrived after the 10-day discount had expired.

Here is compartmentation with a vengeance. Here aggressive product development, design, advertising and sales effort are hampered by inadequate billing and accounts-receivable procedures.

In one company which has more than 1,500

commission salesmen, commission checks, were supposed to be mailed every Thursday, but were delayed constantly. Salesmen often lost time waiting for travel funds. The executive in charge of calculating, approving, writing and signing commission checks clung desperately to methods devised years previously. Despite modern automated equipment in other departments (such as accounts receivable and accounts payable), he refused to change. His weight and seniority made his decision stick. Though the sales department fumed, it could not break down the iron curtain of department compartmentation. When the situation worsened, the older man was retired and new methods introduced. Today, automation speeds checks to their destination on a fixed schedule so the Seattle salesman receives his the same day as does one 2,000 miles nearer the factory. As a result, salesmen lose no time awaiting funds, they are happier, and sales have increased.

A medium-sized contractor found he lost contracts because of delays in preparing bids. Overtime was growing burdensome in his estimating department which, by World War II standards, was well-equipped. After the embarrassment of submitting several important bids after the contracts were let, this contractor installed computers. Accustomed to preparing bids from $250,000 to $1,500,000 each, this computer pays for itself in labor-saving alone. More important, it enables the contractor to get bids in on time and to increase his accuracy of estimates. One or two extra contracts a year more than pays the $1,100 monthly rental of this small, relatively-inexpensive computer.

Modern management is learning to assay automation's benefits. The old idea—to think of automation solely from the standpoint of time and labor saved, or in terms of ease and speed with which data-processing and other paper-work tasks are handled—is the office manager's viewpoint.

Applications abound

Automation brings so many benefits that it actually enables management to minimize savings in labor costs. Collateral benefits include these:

1. Improved customer service through rapid and more accurate billing and invoicing.
2. Increased speed in computing quantities of raw materials, supplies, parts, ingredients, plus greater accuracy in forecasting requirements.
3. Greater coordination between purchasing and sales and elimination of the costly back ordering problem.
4. Better sales analyses—by item, size, color, and style, by salesmen, customers, territory, percentage of total industry sales, and sales per capita. Automation's big advantage is receipt of data in time to take remedial action or to capitalize on favorable conditions.
5. Greater speed and accuracy in engineering calculations.

These are but a fraction of the collateral or extra benefits of putting automation to work in all departments of a business, and of eliminating compartmentation. In many firms inventories and payrolls, accounts receivable and payable are automated, but the same equipment is not used for sales analysis, sales forecasting, market analysis and similar tasks—the company's weakest point. Similarly, there are many organizations where an alert sales vice president uses automation to get figures that repeatedly help outrun competition. And while the sales department profits by automation, perhaps another department—purchasing, manufacturing, shipping, branch warehouse inventories or costing — by using obsolete methods, creates delays which hamstring the progressive sales department.

No margin for error

Smart companies that employ automation use it as a selling point. For example, one wholesaler installed automated inventory control, billing and invoicing. His sales manager covered the territory served, explaining to customers how they would benefit from the new system: invoices included with shipments, fewer errors in pricing and extensions, almost complete elimination of "temporarily out-of-stock" items. Six months after installation of automation, the wholesaler's customers praised the company for accurate billing, invoices, with shipments, and elimination of back orders.

The difference in profits between companies in the same industry, that sell through similar distribution channels, is often puzzling. While this profit variation springs from different causes, at least part of the difference is due to fewer accounting errors. It is due also to greater speed in getting the facts management needs for action, which enables top men to correct errors before they become disastrous, to plan more precisely, and to work within the ever-narrowing margin for error.

One or two mistakes, a few delays, and failure to catch an error early may wipe out the few cents that remain as possible profit from the sales dollar. Modern automated data-processing is destined to play an ever-increasing role in giving management the figures it needs to plan ahead and to keep pace with the jet-propelled speed of today's business. ■

The Royal McBee LGP-30 computer interprets the Magnetronic Reservisor's output for the communication network.

The Data Organizing Translator (DOT) takes a punched card ticket with up to four different flight legs and automatically determines which stations to notify; then creates a punched card at each station selected.

American Airlines Continued

puter, operates at moderate speeds, and features a simplified input and read-out system that can be managed by an average individual after an hour of training. The drum, turning at a speed of 1170 revolutions a minute, produces an access time of approximately 50 milliseconds, which, while relatively slow in comparison with high speed general purpose computers, is fast when measured against the requirements of a commercial application. The most frequent operation on the equipment involves about 16 revolutions of the drum, for a total access time of 800 milliseconds, which is still less than one second.

The programming, computing, and storage operations of the equipment are duplicated in two units of the machine. All transactions are introduced into both units of the Reservisor and compared for similarity at four key steps in the program. If a discrepancy occurs, signals are generated which provide a warning both to the input station and to the technician on duty. Should the failure be something that cannot be remedied immediately, the defective half of the apparatus is disassociated from the line and operation continues using the other set of parallel equipment. If the trouble involves a storage drum, it can be uncoupled quickly from its mate and operations resumed using a single storage drum. When restored, its inventory can be brought up to date in a transfer operation requiring only one second. Uninterrupted performance is highly important, particularly since no other consolidated record of seats sold is maintained. A tribute to the design techniques used in the Reservisor is the impressive record of 99.8 percent up-time. The machine operates 22 hours a day, with two hours given to preventive maintenance.

The story in lights

To a customer at an airline ticket counter the only visible evidence of the Reservisor is the agent set, a small device resembling an adding machine. It has buttons for the days of the month and for the seats. At the top of the set is a slot where a small metal plate can be inserted. This plate, known as the "Destination Plate," is the master key to the complex memory drum of the Reservisor. With less than fifty of these plates, the ticket agent can communicate with the Reservisor regarding information on any one of nearly three thousand flights daily. Notched edges on the plate control a series of snap switches in the agent set which in turn impulse the Reservisor.

As a simple illustration, suppose a traveler stops at an American Airlines office in New York City and requests two tickets to Chicago for the following morning. The agent selects the proper destination plate, drops it in the slot, punches the proper buttons for the date and seats required, and flips a switch. In a few seconds some of the eight lamps on the agent's set will glow. These lights tell the agent that he can confirm definite reservations to Chicago on several non-stop flights for the following morning. If there are no lights, he knows that there are not two seats available on any of the morning non-stop flights. If the traveler decides to take two seats on, say, the 10 o'clock flight, the

agent pushes the button in front of the 10 A.M. section of the plate and flips another switch marked "Sell." This time, only the lamp in front of the 10 A.M. section relights. A large green lamp, reading "Check," also lights up, indicating that the Reservisor has acted as requested, subtracting two seats from those available on the 10 A.M. flight. The agent then issues the tickets, and the transaction is completed.

The agent's set in this example is only one of hundreds that can communicate with the Reservisor at the same time. Each in its turn is connected to the memory drum for only a fraction of a second, but each has its own power supply so that the agent can keep the answer visible as long as he desires.

Sold, American

When a request for space involves a specific flight, the preliminary availability check is omitted and the agent immediately tries the "sell" operation. If no seats, or if less than the required number of seats, are available the amber "Reject" lamp lights. If the agent omits a digit of the date or commits some other mistake a red "error" lamp tells him to check his actions and try again.

In 1956, a new and larger Magnetronic Reservisor was installed in the New York West Side Terminal, replacing the 1952 machine. With the new equipment it is possible to dispense flight information in addition to availability and inventory. The schedule position of any of American's flights is now available instantly through the use of the agent set. The new Reservisor provides availability and inventory for thirty days in advance, and availability only, for a year in advance. For instance, the machine could now answer a query concerning available space for flights on next Christmas Eve.

The Reservisor operates virtually unattended, but it is equipped with a master agent set assigned to a supervisor—a set that has complete control over what information is in the drum, being able to read it out at will and alter it in any manner desired. The master set is used to adjust specific days for deviations from the standard schedule, such as omissions of flights or changes in the number of seats available. Each midnight, when the flights for the day just ended are either completed or in the air, all information for that day is removed from the Reservisor and a new "30th day" added to the inventory. Some reservations will, of course, be made for more than thirty days ahead and will not be part of the Reservisor inventory. These reservations are maintained on charts and following the midnight transfer, the master set records any of them that affect the new 30th day.

The Reservisor has counters that record the number of availability checks, sales and cancellations coming over each of the incoming circuits as well as the totals for the whole system. It also has a monitor printer which can be connected to any of the incoming lines to produce a complete analysis of the traffic handled.

When a flight is sold out, it is desirable that supervisory personnel, as well as remote stations in other cities not directly connected to the Reservisor, be notified as soon as possible. When the Reservisor seat inventory on any flight reaches zero, the monitor printer calls attention to the sell-out by printing the date and flight number information. This information also comes out of the machine in paper tape form. One problem in the past was the delay in making this sell-out information immediately available to the proper points along the airline system. The delay is caused by the time necessary to determine what points must receive notification of the sold-out condition for a given flight. Further delay results from the fact that the Reservisor's tape output is not in the common language of the airline's communication network.

The delay problem was solved by programming a Royal McBee small-sized computer to accept the tape message from the Reservisor, determine what points on the system must receive the information, and produce the message and routing in five channel tape. The tape is then instantly fed into American's automatic Teletype system. As a result of this unusual application of a computer, the critical "sold-out" message is available to the entire system in a matter of seconds after the Reservisor's "Sold Out" signal.

"It's complaining about all the overtime."

In August, 1957, the research group turned their attention to the third major problem of the reservation system, the handling of the name, and other written data of the transaction. With availability and inventory information being processed at electronic speeds, it was obvious that something must be done to automate the tremendous paperwork volume which was a drag on the entire operation. The first decision was to convert all reservation records to punched cards. Then the research group, working jointly with International Business Machines Corp., developed a piece of equipment known as a Data Organizing Translator—referred to as "Dot" by airline personnel.

The Dot machine is basically an IBM Model 858 Card-A-Type with special programming and storage devices which gives it some of the characteristics of a small computer. As keypunched reservation records are fed into the machine, it decides whether one or more messages need be sent to other stations and, if so, whether the stations are on American or another airline. It then determines the code directing characters that should prefix each message so that the automatic Teletype system can transmit the message to the proper destination. Dot then prepares the message, organizing the text for each station depending on that city's position in the itinerary. A five-channel paper tape is produced and automatically fed onto the Teletype lines with suitable on, off and sequence codes added. In addition to the tape output, Dot produces copies of each message on an electric typewriter. An additional typewriter can produce various sales information.

Leave it to DOT

As an illustration, suppose a passenger purchased a ticket in Buffalo for a trip covering stops in New York, Detroit, Chicago and Los Angeles. At Buffalo the ticket would be converted into a single punched card with each flight number and destination (termed flight legs) indicated. The card would then be fed into the Data Organizing Translator where the information would be organized for Teletype transmission. In just a few seconds the reservation messages would be automatically routed to the cities involved. Seconds later, each of the four cities would have a reservation card, converted on a tape-to-card machine, containing all of the necessary information to book the passenger's flight in that city.

The Dot is capable of recognizing a mixup in reservations even though it may have slipped by airline personnel. If the information in the keypunched card is not logical, according to Dot's way of thinking, the message is rejected from the system and printed, in red, on the monitor typewriter. The first Dot was installed in Buffalo in March, 1958. The machines are now in action in all of the principal stations of American, including New York, Dallas, Detroit, Chicago, Los Angeles, Boston and Washington.

A large percentage of American's passenger traffic is on the popular non-stop flights between major cities, such as New York to Chicago. As these flights terminate at the first stop there is no routing problem except to arrange return space as specified by the passenger. In these cases the Dot is bypassed in favor of the faster IBM Data Transceiver. Cards fed into the Transceiver are duplicated at the receiving end at a speed of 500 cards an hour.

A system of merit

Another inovation at American is the use of an automatic "telecard" system for relaying passenger information faster and more accurately between the airline's major reservation centers. Messages are automatically typed on separate cards which, when detached, are ready for immediate machine processing.

Recently the Teletype network has been expanded to accommodate "Teleticketing," said to be the world's first system to print air travel tickets in any business office.

Especially designed for volume users of air transportation, the new system uses a special Teletype receiver modified to accept a continuous seven-part ticket form. The ticket is transmitted from previously prepared and verified tape in the airlines office, assuring the accuracy of the fare, tax and other non-variable information.

American officials are quick to credit the airline's advanced position in reservation handling to one man—Charles E. Ammann, Director of Advanced Process Research. Ammann holds American Airlines' Award of Merit for his contribution to aviation through his development of automatic reservations and information disseminating equipment. He has been with the airline since 1943, and also serves as a consultant to the United States Government's National Security Agency.

Officials at American estimated that under the old system, 80 percent of lost revenue could be charged to errors that occurred in the reservation system, the result of writing, checking, rewriting, rechecking, and double checking pieces of paper, that in themselves were worth less than a penny. In money terms, this involved millions of dollars annually. Automation of its reservation and communication system was American's answer to the problem and the dawn of the jet age in United States air travel finds American Airlines with the most modern automated data processing system in the transportation industry. ■

"Treat 'em like newborn babies," says one engineer with much experience in planning the right housing for automated equipment.

Nine Ways to Avoid a Headache

PLANNING a fool-proof, headache-proof home for automated equipment is a job for the experts. And the best insurance against difficulty and possible failure in any program of automation is careful planning—with expert help—of every step in the pre-installation stage. As one authority puts it, "All the trouble we have had in getting automation under way came from our failure to provide proper 'housing,' not from machine failures."

Here are nine important points and possible problems, all of which can be a source of housing headaches:

1. Temperature: Automated installations generate tremendous heat. This must be taken out of the machine area. In some cases, existing air conditioning facilities are not precise enough to get the job done. Some installations require 75 degrees temperature, plus or minus no more than one degree.
2. Humidity: Accurate control of humidity is a "must" for many installations. Some equipment requires a constant 50 per cent humidity, with little or no variation. Both temperature and humidity controls depend upon equipment.
3. Water cooling: Where equipment generates heat, cooled water may be a necessity. Refrigeration, pumps, and well planned under-floor piping are requirements. Water is cooled, used, and then re-used in some cases.
4. Floors: Typical office building floors frequently have a load bearing capacity of 70 pounds per square foot. Certain installations of the larger units require stronger floors.
5. Ceilings: Acoustic treatment is needed. Certain machines are noisy to the point of distraction without acoustic tile in ceilings.
6. Walls: Noise bouncing against walls must be absorbed in some rooms where noisy equipment is operating. The best advice is to have acoustic walls down to approximately shoulder level.
7. Wiring and power: Heavier than standard conduits and wiring may be required, especially in old buildings. Engineers strongly advise wiring to accommodate additional equipment, since automated equipment and departments are usually saddled with more jobs than originally planned.
8. Visitor facilities: With all the interest in automation today your automated equipment will attract visitors. Plan a way to handle them, and if possible find a way to let them see the equipment without walking through the department.
9. Decoration: A big room of automatic accounting, data processing or computing machines, along with the machines necessary, all finished in gray or some other sombre color becomes tiresome to workers. Most recent installations have turned to gay colors and decorating treatment.

Nine Check Points to Avoid Installation Headaches:

- Temperature
- Humidity
- Water Cooling
- Floors
- Ceilings
- Walls
- Wiring and Power
- Visitor Facilities
- Decoration

Few buildings, even the most modern, can provide air conditioning equipment without special temperature controls sufficient to maintain the steady temperatures needed where tape and punched cards are being processed. Air conditioning equipment installed for human comfort is usually inadequate for computing and data processing departments. In one recent installation, engineers recommended two ten-ton refrigerating units, with two ten-ton standby units in the event of failure. In another installation, two ten-ton units, with one ten-ton standby unit, were approved by the engineers.

Temperature problems are complicated by the heat generated by electronic units. This heat must be conditioned to the proper temperature both for the machines and the personnel. To obtain the right climate for both, considerable engineering skill and careful planning is necessary.

Without controls, humidity varies from hour to hour just as temperature does. But the big electronic units require an unchanging amount of moisture in the air. Usual equipment for removing and controlling air borne moisture is seldom sufficient to provide the steady 50 per cent humidity needed for data processing rooms. Special equipment to correlate room temperature and humidity is nearly always necessary. In rooms where outside windows are exposed to low temperatures, it may be necessary to use double or triple windows, or to use special glass to prevent condensation from forming—in other words to prevent "sweating."

Considerable quantities of cooled water are needed in some installations—so much that it is necessary to recirculate, re-cool and re-use the same water. Cooling equipment, pumps and considerable piping are a part of the needed water supply for certain data processing and computing departments.

New floors are required for computer installations in most modern office buildings. These buildings are usually constructed to carry a load of 70 pounds per square foot, which is not sufficient for a roomful of big machines. Up to 150 pounds per square load bearing capacity may be needed. To prepare floors, call in the architect who built your building if possible. He will check the floors and determine whether major structural changes are needed. Often it is possible to add modern flooring without extra structural members or reinforcements.

Several companies now offer a flooring especially designed for the big machines. This flooring comes in small units and is designed to accommodate electrical conduits, cooled water piping, temperature controls and all other facilities with quick, easy access to cables or pipes. Access is achieved by lifting rectangles of the flooring with a special tool—sort of a glorified suction-cup arrangement similar to the old plungers used by plumbers. Every few feet this flooring is supplied with leveling devices to achieve a perfectly level support for machines.

With this flooring it is easy to achieve complete flexibility because power outlets are always accessible. In some old buildings it has been necessary to drill through concrete to obtain access to power lines when departments were rearranged or new units added.

It is no secret that some units of modern data processing and computing departments are noisy. Acoustical ceilings, with walls acoustically treated down to about shoulder height are generally recommended by experienced engineers. Many types of acoustical ceilings are available. Some types of ceilings provide for diffused shadowless lighting as well as noise absorption. The egg crate ceilings with diffused lighting are popular. So are fibre glass insulated ceilings, with the fibre glass behind perforated metal. One company found a double noise problem—noise bouncing around within the department, and noise leaking through air

New raised flooring provides ready access to power and cooling facilities. Sections are easily lifted by means of suction device, yet are snug-tight when replaced.

ducts to other departments. Fibre glass insulation solved both problems.

Since high level lighting is now considered a must for modern offices it seems wise to engage both a lighting and acoustical engineer to work together, planning both at the same time. Neither lighting or acoustical planning should normally be trusted to a local electrician or small building contractor.

Standard power lines found in usual buildings are too light for the larger automated installations. This means heavier wiring, with easy access to cables at frequent intervals, is a necessity. If your building has no built-in voltage regulators it may be necessary to add them to your electrical facilities.

Let's face it, you will have visitors. Wide interest in automation means that your installation of automated equipment will be a magnet for visitors who want to see it. Plan for the visitors; they are inevitable. One newcomer to automation, The Bank of New York, is just completing a basement room, beautifully decorated in striking colors, with a corridor for visitors who can watch the department at work through a big window, without interferring with work routines.

Even decoration problems will arise. Usually finished in gray or some other neutral tone, automated equipment soaks up light. Without special wall and ceiling treatment light may be wasted. Colors, designed and planned to break monotony and add a cheerful atmosphere to automated departments is thought to be a good investment by many companies. Some executives even go so far as to declare bright, colorful decorative schemes will reduce employe turnover.

As an example of overall planning for automation—when Colgate-Palmolive's new building at 300 Park Avenue in New York was in the planning stage, the firm decided to put the accounting department's automated equipment on the fifth floor. Management enlisted the help of Ebasco Services, Inc., one of the country's largest management consulting and engineering firms with a backlog of wide experience in planning for housing electronic data processing equipment. This company used air conditioning, electrical, acoustical and other engineers to plan and engineer Colgate-Palmolive's fifth floor. They provided extra air conditioning and humidity control, acoustical treatment, easy access to power cables and other conduits and piping, through lift-up floor panels. The Colgate-Palmolive installation began operating with an absolute minimum of difficulty because of long-range engineering and planning by experienced persons. Similar long-range planning is now being employed by Dean Witter and Co. in their new quarters at 2 Broadway Street in New York, and a big Chicago bank is coming to the end of a two year planning job in installing a comprehensive automation program.

While at times your professional advisors may seem to demand too much stand-by equipment, or to insist upon building too far into the future, it is usually a good idea to carefully consider their advice. Cases are on record where some companies skimped at various points in preparing facilities for automation and then had serious trouble when the equipment was activated.

Several other items need to be checked and planned. For example—where will you store tapes? Where will you store cards? Do you need mechanical or electrostatic dust control systems?

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In a simulated railroad operation—the machine flashes car numbers on the screen while simultaneously producing a printed record. Basic units of the automatic print-out system are a 10-pound remote control TV camera, a 17-inch screen monitor, and a teletypewriter.

An MBA Product Preview

TV as a Business Machine

TELEVISION as a business machine—a new, dramatic concept of data processing—is in the final development stage at the laboratories of TelAutovision in Los Angeles.

Using low cost closed circuit television equipment, TelAutovision engineers have obtained an automatic print out of a coded number on a teletypewriter, while at the same time projecting a picture of the number on a television viewer. In addition to the print out, the system will also produce a standard five-channel tape.

The ability to use television as business tool opens tremendous possibilities in the field of data processing. One application demonstrated by TelAutovision involves automatic transmission and recording of railroad car numbers. The TV camera views the coded car number on a moving freight car and transmits the information to the teletypewriter. The same information can be punched in tape or in cards. Simultaneously a person watching the TV monitor can note the condition of the car and verify any other required information as it passes before him on the television screen.

Basic elements of the system include a remote control TV camera, weighing only 10 pounds, a 17-inch screen monitor, and a teletypewriter. A storage device captures the televised impulses and slows them down for the print out operation. The system can also include a master receiver which combines the function of the camera control and the 17-inch monitor. All operating controls are mounted at the front of the receiver. Complete camera control is possible at the viewing site—no other single camera controls are necessary. An intercom can also be included in the system.

At present, the number to be transmitted for print out must include the standard five-channel tape codes. This would pose little problem to the railroads but would limit the system in some other areas. However, with the rapid developments in the field of magnetic character reading, it would seem that data processing by television will have unlimited possibilities. Other manufacturers are known to be working on systems that will scan a bank check or other numbered documents and automatically type out the number on a card or tape. But television offers the additional advantage of "sight" along with automatic reading.

The new automatic print out system is the latest product of the TelAutovision division which has already installed regular closed circuit TV in many businesses. Some of the larger airlines are using the equipment to speed flight information visually to various points in the air terminal.

TelAutovision, a division of the TelAutograph Corp., is known for its "Electronic Pencil," a system that transmits hand written information over wire. Recently the firm became American distributors for the Olivetti Teletypewriter. ■

You Can't Automate a Mess— First You Have to Get Organized

By Harold Wood

THE COMMAND, "Let's Automate!" can initiate an orderly attack on the paperwork burden and result in better operating efficiency for the entire organization. On the other hand, the same command can add costs and chaos to an already confused operation. The difference lies with the conditions that exist prior to automation.

The company where paperwork, though a problem, continues to move in a systematic fashion will readily behold the benefits of business automation. The company that is so back-logged and mired with paperwork that its entire operation is impaired, may find automation just an additional burden. Simply stated, you can't automate a "mess"; you can't add machines to a system that has already collapsed.

Yet this is just what some executives have tried to do. They have sat by, ignoring paperwork volume, while, like Topsy, it "just growed"—and to mountainous proportions. They have devoted expensive hours to carefully planning production and marketing programs, all the while unaware of the paperwork flow that would have much to do with the success or failure of the program. They have watched while an antiquated paperwork system has created parts shortages, halted assembly lines, delayed shipments and prevented invoicing. In the meantime costs rise, profits fall—and tempers flare. Then, the call for "automation." The call should be for "investigation."

The situation as described is not uncommon. Paper, in some form or another, controls just about every movement of a corporation. Yet, in many organizations, it is the item of least concern and understanding. In these cases automation becomes a difficult, if not impossible, task. The reason? Simply because a company that allows itself to become bogged down with paperwork lacks system-minded management at the department level. And if the automation effort becomes the responsibility of the "anti-system" people, it is doomed.

Take the case of a large Philadelphia distributing company. The firm decided that it was imperative to speed up customer service and reduce the cost of processing orders through the office and warehouses. Top management, with little real understanding of the paperwork problem, assigned the task to the office manager, a twenty-year man with the company. To this man, automation and punched cards were synonymous, and without hesitation, he committed the company to a punched card program involving several thousands of dollars in monthly rentals. His decision was not necessarily a poor one but his action was premature. First, in his haste to automate, he failed to review the entire existing system and to take into his confidence the various department heads that would be involved in the change over. This lost some valuable allies. Secondly, though out of touch with many of the ramifications of the existing procedures, he took it upon himself to make final decisions on such things as routing,

Crash Program!

copies and necessary reports. His was a crash program, and crash it did. Expensive forms were hastily designed and jammed through purchasing without benefit of competitive bidding. Equipment began to arrive before a location was readied. Experienced personnel were hired to operate equipment that wasn't installed. System design and procedure writing was improvised from day to day. Each department head wanted all of the copies, all of the reports that the old procedure had provided and defied any attempt to remove or change them. The office manager, lacking top level authority and reluctant to clash with other long time employees who had "friends" in high places, yielded to compromise. As a result, he was trying to mechanize a system that had already proved a failure on a manual basis. He had added punched cards to the paperwork burden. His automation program failed to orbit. Finally, a consulting firm was brought into the picture and an entirely new start made. But it will take many years of successful operation to offset the pains, and costs, of the false beginning.

Contrast the Philadelphia story to a similar company in Dayton, Ohio. Faced with much the same problem—improved customer service and reduced costs in order processing—management assigned the problem to the vice president-controller, a man familiar with office procedures, accounting, warehouse and manufacturing techniques, purchasing and shipping problems. He in turn appointed a small group, people familiar with the various phases, to help him study the nature of the problem. The committee made a preliminary survey of the present method of operation, pointing up the problems involved in the system and offering, in broad outline, a general solution. After reviewing the study, top management authorized the vice president-controller to continue his efforts, to lay out specific objectives and the method to be used in solving the problems. The firm employed a consultant to aid in the latter.

The committee went back to work. Each operation, from the time the mail was received in the morning until the time the material was shipped, was studied as a separate function and viewed in relation to the other functions within the company. Simple, but detailed procedures were written and controls established for each operation. The processing of orders was set up on a "production line" basis, with order editing, credit approval, order processing and invoice writing integrated with other necessary functions and placed in proper sequence. Having determined the proper flow of documents and the information necessary for each department, a study was made to select the best equipment for the proposed system. With the equipment selected, the designing of forms completed preparations for the system.

The new system went into action just 11 months after management had authorized the study. During the first year of operation the company saved more than $200,000 in personnel expenses. Sales increased about 10 percent without any additional salesmen or promotion. Customer service was improved, orders were speeded up, and management reported that day to day operations of the business was made simpler because of the new system. Production of each individual in the office and warehouse increased, and all orders received up to one hour before closing time were shipped and billed the same day. Inventory controls became more accurate, and backorders became almost non-existent. The Dayton firm had automation working and was receiving tangible benefits, while the Philadelphia company was still trying to repair the damage caused by the "crash" program.

Unfortunately, the Philadelphia episode is more prevalent in business today than most business people care to admit. Many companies, both large and small, have failed to place the responsibility and authority for such functions as systems, procedures and forms control at the proper level in

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New Products

Electronic Printer

This new S-C Model 5000 electronic printer can print the output of computers at 4,680 lines a minute, which is reportedly five to 10 times faster than present electro-mechanical printers. The device is a combination of Stromberg Carlson's Charactron Shaped Beam Tube and the Haloid Co.'s Xerox Copyflo printer. In addition to applications in the data processing field, commercial possiblities of the printer include preparing bank statements, billings, insurance notices, and manufacturing control reports. Circle No. 1-1.

TV Communications

Closed circuit televising of written and printed matter is possible with this new telecommunications system. To send a picture to any number of stations, the operator places the paper in the reader which contains the camera, lighting, guides, and a remotely controlled positioning device. Then he pushes buttons for the stations desired. The picture transmitted has 600-line resolution. according to the manufacturer, Tel-Autograph Corp. Camera and receiver are locked together electronically to prevent "picture flip, tear or roll." One application is the televising of data from a central file. Circle No. 1-2.

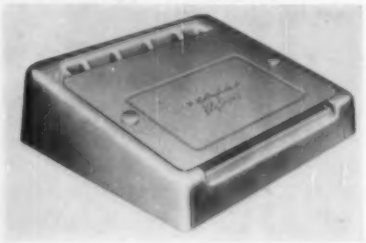
Data Integrator

This data integrator accepts fixed data from tabulating cards, variable data on its keyboard, and automatically combines them into punched tape. The new device cuts tabulating card files by 50 per cent and increases productivity by 100 per cent, according to the manufacturer, the pdp Division of American Electronics, Inc. Tape output of the integrator can be fed directly to a computer or tape-to-card converter. Applications include inventory and production control, banking, and accounting. Circle No. 1-3.

Plastic Laminating Unit

This new desk-top plastic laminating machine keeps important papers from becoming "dog-eared and soiled" by encasing them in thin layers of plastic. The manufacturer, American Photocopy Equipment Co., says that "the process fuses the plastic to one or both sides of an original document to beautify and protect it." The Ply-On Laminator can be used for such documents as contracts, shop orders and specifications, price lists, lab reports, bulletin board items, and photographs. Circle No. 1-4.

Multi-Copy Photocopier



Five, ten, twenty—any number of copies can be made from just one master with this new photocopy machine. The manufacturer, Cormac Photocopy Corp., says that the Polycopier eliminates the "peel-apart" operation which is necessary with many other photocopy machines. Polycopies are made with one sheet only—the negative—which becomes the master from which many copies can be run, and which can be filed for later use. All types of original material can be reproduced, including all inks and colors. Copies are permanent, and the 20th copy equals the first in clarity. The Polycopier can also be used for in-office copying from microfilm readers. Circle No. P-1-5.

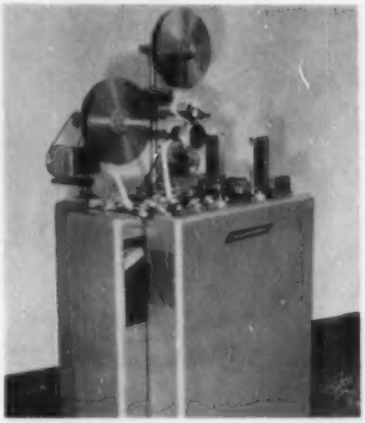
Book Photocopy Machine

New photocopier which will copy from books without removal of pages or loss of margins is manufactured by Copease Corp. The unit is a combination exposer-printer. An automatic timer provides accurate exposure, including writing from ball point pens, fountain pens, colored pencils, crayons, and spirit duplication. Two sizes are available: Model A for copy work up to $8\frac{1}{2}$ by 14 inches, and B for work up to 14 by 17. Circle No. 1-9.

Heat-Seal Unit

This new Heat-Seal Unit is designed as part of a low cost, volume post card billing system which transforms one side tabulator-imprinted forms into post cards with the necessary data on both sides. The unit, manufactured by The Standard Register Co., folds and seals the cards. In continuous action, the sealed forms then feed through a burster where they are separated into individual post cards. The speed of the Heat-Seal Unit is equal to the speed of the burster it works with. According to the manufacturer, the advantage of the equipment is that it eliminates the need for two passes of forms through a printer or tabulator. Circle No. 1-10.

Tape Printer



This new high speed tape lister can print from 30,000 to 40,000 five-line addresses on tape in one hour. The printer—Scriptomatic Corp.'s Model 301—uses standard punched cards as masters. Other features are continuous loading and unloading of card masters and a tape marking attachment. Tape may be $\frac{7}{8}$ to $1\frac{1}{8}$ inch wide. Model 301 is $19\frac{1}{2}$ inches wide, 33 inches long and 58 inches high. One application is for users of large lists. Circle No. 1-11.

Automatic Duplicator

"Push button" control is available with this new automated offset duplicator. At the same time the machine starts, the master is moistoned. Image development and feeder start are simultaneous. A counter stops the machine automatically at a pre-determined sheet count and resets automatically for the next cycle. Extra copies can be run without resetting the counter. When the last sheet is fed, the machine stops automatically. Manufacturer is Addressograph. Multigraph Corp. Circle No. 1-12.

Payroll Auditing System

New payroll auditing system uses a time clock that punches time-identification holes in each employe's time card, and an auditor that automatically audits the cards and prints the full pay period time on each. According to the manufacturer, Cincinnati Time Recorder Co., the system reduces auditing to minutes. It can be used with data processing or conventional systems. Speed is 1,800 cards an hour. Circle No. 1-13.

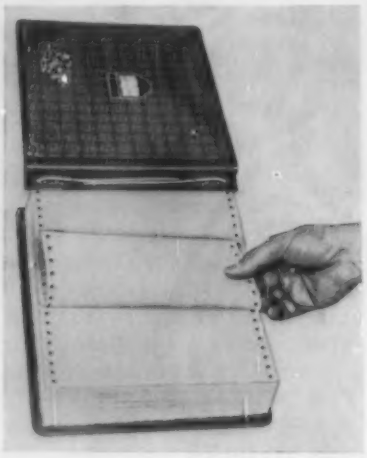
Electroplotter

Above is an automatic plotting machine for graphing business and scientific data. Manufactured by Benson-Lehner Corp., the Model H Electroplotter will plot points and symbols and draw straight lines. Available inputs include keyboard, punched cards, punched paper or magnetic tape, and outputs from automatic data handling systems. Speed is from 15 to 20 lines a minute from parallel input, 12 to 16 lines from serial input. Circle No. 1-14.

Closed Circuit TV

"Remote viewing of an action" or process otherwise inaccessible or hazardous" is possible with this new closed circuit television system. Manufactured by the Industrial Products Division of International Telephone and Telegraph Corp., the basic system consists of a "new and improved" vidicon camera, monitor, and control unit. The camera features an electronic light compensator which instantly and automatically adjusts to compensate for light changes over a range eight times that normally covered by lens stops. Circle No. 1-15.

Nylon Post Binders



New nylon post binders for marginal punched forms come in two styles: the Saratoga (above) for unbursted continuous forms and the Arlington for bursted forms. Posts are made from a nylon cord $\frac{1}{8}$ inch in diameter. Binders have locking mechanism and will hold most sheet sizes. Manufacturer is the C. E. Sheppard Co. Circle No. 1-16.

Electronic Writer

This new electronic writing machine is capable of producing both local and remote records of long hand messages. No training is required; the instrument is used just like an ordinary pen and pad of paper. No separate wiring is needed; it can operate over any standard telephone or radio circuit. Known as the Electrowriter, the machine is manufactured by Comptometer Corp. Any number of Electrowriters can be connected with each other. Circle No. 1-17.

Accounting Record Safe

This new machine accounting record safe is designed both to protect valuable records against fire and to provide easy accessability to the documents. According to the manufacturer, Mosler Safe Co., the unit has been tested to safeguard records from fire "up to 2,000 degrees fahrenheit for four hours." The safe contains ledger trays in a movable drawer which can be slid onto a wheeled posting tray stand without lifting. Girls can remain seated during the operation. Below the drawer there is additional room for records. The unit is available in multiple shelf models which will hold up to 16 ledger trays. Circle No. 1-18.

Spirit Duplicator

Among the features of this new Mark III Conqueror is a new feed table with stripper fingers which permit only one sheet of paper to be fed at a time. New adjustable feed wheels provide for even, non-skip feeding and prevent lint from forming in the copy area. A dial-operated tension control compensates for various weights of paper —from thin sheets to post cards. It can be readjusted while the machine is in operation. The machine is said to have nylon gears which are silent, need no lubrication, and "are four times longer wearing than steel." The drive works only in a forward motion, which is said to eliminate the lurch that causes uneven printing. Circle No. 1-19.

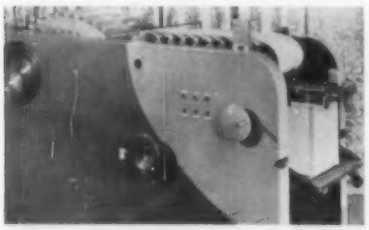
Mechanized Filing

This new, large-capacity Kard-Veyer mechanized filing unit is designed to simplify and speed office operations that require reference to large numbers of index cards, records, and master punched cards. Manufactured by Remington Rand, the new filing machine comes in four standard models which can be modified to 75 different sizes and capacities according to customer specifications. Push-button selectors allow operators to bring card trays to working level without leaving their seats. Circle No. 1-20.

Instruction System

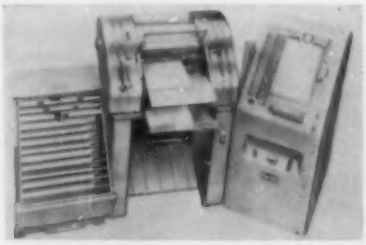
Oral instructions to individual workers, instead of printed words or diagrams, are now a possibility with this new worker instruction system. According to the manufacturer, Dictaphone Corp., the system increases productivity and cuts down on worker fatigue. Two Dictaphone machines form the base of the AIMO (Audio Instructed Manufacturing Operation) system: one to record the instructions and the other to reproduce them. A special button allows the instructor to give one "block" of information at a time. The worker can "backspace" to rehear it. Circle No. 1-6.

Automatic Collator



This new automatic collator will collate and deliver from 15,000 to 25,000 sheets stapled in sets an hour. Known as the Roto-Matic, it has 50 bins, each with a capacity of about a half-ream of paper. Other features are an automatic sheet detector for discovering misses and doubles, automatic pile delivery, and a new programming dial. Various combinations of collating jobs can be programmed—sets of 50 sheets, 25 two-sheet sets, 10 five-sheet sets, and many others. Any number of bins can be eliminated from the collating operation. Manufactured by Thomas Collators Industries, Inc., the unit is 80 inches high, 30 inches wide, and 49 inches deep. Circle No. 1-8.

Selective Data Printer



This automated selective data printer can electronically select, eliminate, condense and shift lines, columns and headings from one master—without masks, blockouts, strip masters or shingled forms. Items may be chosen from anywhere on the master, in any combination and quantity. Known as the Ormig Electronic, the new machine is manufactured by the Ormig Organization in West Germany and distributed in the United States by Copy-Craft, Inc. Among its applications are speedy handling of back orders, production control, order-invoicing, sales analysis, and purchasing. Push buttons on the always-visible control board panel control selection from the master. Circle No. 1-7.

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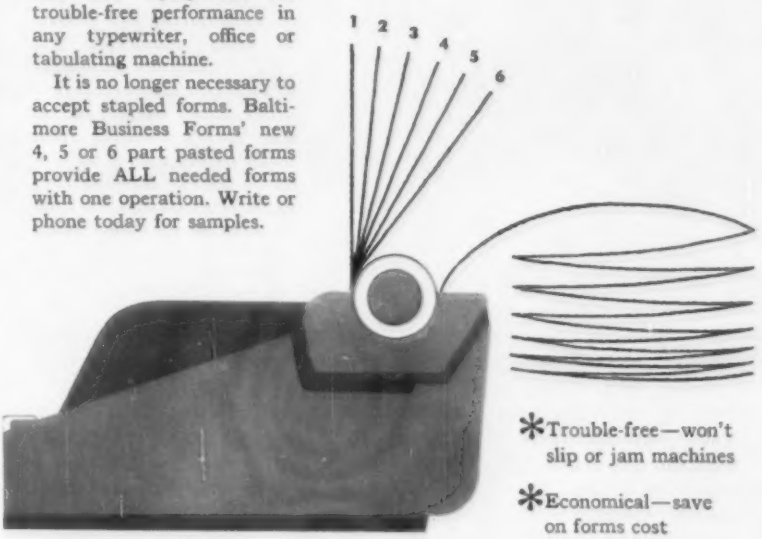

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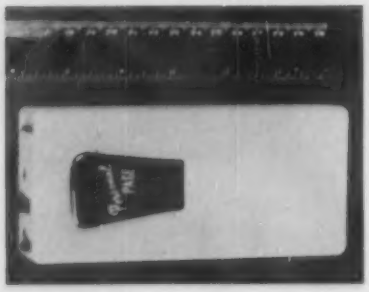
For More Information Circle Reader Service Card No. 1-58

Pocket Paging System



No bells, lights or public address calls are necessary with this new all-electronic radio pocket paging system. Any number of busy executives can be contacted instantly in this way: When the switchboard operator wants to page a particular person, she dials his "Personal Page" number. The call number is transmitted by radio to the miniature receiver the individual wears in his pocket or on his belt. When the transistorized receiver emits a tone signal, the individual knows he is being paged and that he should pick up the nearest telephone. Personal Page is manufactured by The Readinger Corp. Circle No. 1-21.

Tape Punch

This new tape punch both perforates incoming line signals and simultaneously prints corresponding characters on a tape. Automatic, the unit operates at 100 words a minute and is manufactured by Teletype Corp. Another closely related machine manufactured by the same corporation is a new tape reader which can be used as a read out device for business machines or a transmitting device for printing telegraph equipment. Applications of both machines include communications, data processing and paperwork simplification. Circle No. 1-22.

Collator-Stapler-Stacker

This new high-speed collator automatically staples and stacks duplicated material. The manufacturer, Collamatic Corp., says it "combines the simplicity and low cost of an electric collator with the production and automation of an automatic one." Sets are collated at up to 12,000 sheets an hour and placed on a conveyor where they are stapled and stacked. Circle No. 1-23.

Microfilm Unitizer

This new microfilm printer unitizes from original roll film to Actifilm sheet or Filmsort aperture card or from aperture card to Ozacard "in one simple, dry operation." Development is handled by any standard amonia machine or inexpensive companion tube developer. Three aperture cards may be duplicated at one time. Among the applications of the unitizer is the distribution of engineering drawings in a microfilm system. The unit is manufactured by The Ozalid Division, General Aniline and Film Corp. Its dimensions are 18¾ inches long, 7½ inches wide and 6¾ inches high. Circle No. 1-24.

Storing Unit

Twelve tab card boxes can be stored at a low cost per box in each of these new Tab-Stor units. According to the manufacturer, Dolin Metal Products, Inc., the units are designed to interlock together for "quick expansion." Made of 22 gauge steel, the gray enamel units are 33 inches wide, 14 inches high, and 14½ inches deep, with a 24,000 card capacity. Units come with four caster bases for mobility in the plant. Circle No. 1-25.

Raised Panel Floor

This raised panel floor is designed to support electronic data computer equipment. Adjustable screw jacks rest on the prime floor and support a steel grid on which honeycomb-structured panels, surfaced with standard flooring tile are placed. The space underneath this floor can be used for housing air conditioning ducts and cables. Each two by four modular panel can be raised or removed for easy access to underfloor components. The manufacturer is Bel Air Industries, Inc. Circle No. 1-26.

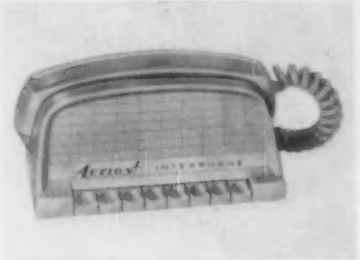
Electronic Punch

This new electronic high-speed punching machine is "rugged, durable, and simple enough for inexperienced personnel to operate." Known as the Model 216 General, the punch occupies less than two and a half feet of space and can be operated on any desk or table top. A pilot light signals that the machine is on and ready to punch paper for plastic or metal loose-leaf binding. Manufacturer is General Binding Corp. Circle No. 1-27.

Communication System

New Communications Control Center is capable of providing communication, program distribution, and automatic time and signal alerts from a single control point. The system, which operates with transistor amplification, has a stand-by power supply which will run the system when AC power fails. It is manufactured by Dictograph Products, Inc., Circle No. 1-28.

Interphone System



Pictured above is a new two to nine station interphone system. Each station is a master station; calls originated on one interphone can reach any other phone in the system. The system requires no batteries. It may be plugged in any standard electrical outlet. The units may also be used as "mikes" to page someone over loudspeakers in stockrooms or plants. The manufacturer is Action Systems Co. Circle No. 1-29.

New High-Speed Line Printer Developed by Burroughs

Development of a new, transistorized line printer that is 50 percent faster than previous machines was announced recently by Burroughs Corp.'s ElectroData Division. The Burroughs 220 High Speed Printer System will select, edit and print-out copy direct from a computer or from magnetic tape at rates up to 1500 lines per minute.

According to Vice President J. R. Bradburn, this system represents a major step in freeing electronic computers from the delay of much slower electromechanical output devices. The printer's features include on-line or off-line operation, buffer data storage and automatic editing under plugboard control. Its vocabulary consists of 51 solid-face characters printed in lines of 120 positions each. Used on-line, the printer system takes advantage of the computer's electronic speed to produce up-to-the-second reports directly from the data processor. Off-line, it edits and transcribes data from magnetic tape storage units, freeing the computer for other jobs.

The printing system consists of two packages: a drum printer and a transistorized control unit, housing a magnetic core buffer and plugboard editing controls. Effective output speeds have been greatly increased by the 100-word memory of the buffer, which allows simultaneous data loading and final printing. The plugboard permits the operator to program-control the printer system independently of the computer.

Together with rotary-switch interrogation features, the plugboard controls make it possible to rearrange, manipulate, edit and merge records without preparing special working tapes. Automatic editing includes the insertion of blanks, decimals, commas, dollar signs, check-protecting asterisks, and zero suppression.

Control over final printing format includes line spacing, skipping, and other versatile paper movement functions. The printer's vocabulary consists of 51 solid-face characters, which print in lines of 120 positions, and printing density is 10 characters an inch.

Planning Does It!

Mess Continued

the organization. They have allowed systems and procedures to become a part-time effort of the office manager; forms control has become a matter of assigning a number rather than a restraint on additional paperwork. This is an appalling situation when one considers that the annual outlay of money for salaries, equipment and general overhead for processing paperwork in the office and plant is, in many cases, a major share of the expense dollar.

Before taking the first step toward automation of paperwork, management should be fully aware of the importance of delegating the responsibility and authority for the initial study to a person with adequate training and both educational and practical background. The selected person must be able to clearly state the problem, analyze it intelligently, and set forth clear and practical objectives. This same person must have complete responsibility and authority to develop the systems and procedures, crossing all departmental boundaries, and have full control over the final installation. It is assumed that every organization has such a man. If it doesn't, automation is probably not the answer to that firm's problems. It is advisable to have available the services of a qualified consultant who specializes in paperwork automation but many successful installations have been completed without outside assistance.

The mounting costs of processing paperwork is of growing concern to every businessman. Automation, of some sort, is in most cases a logical and profitable answer. However, pressing the button of a data processing machine may not always bring the anticipated "miraculous" results.

Once pushed, without proper planning, it may just speed management into an even greater area of costs and confusion.

Kenneth C. Tiffany On Automation

"Thirty-five percent of all medium and large scale computer installations belong to Uncle Sam, who must process some 25 billion pieces of paper each year. As of last December, your employer (the U.S. Government) had 121 computer systems, representing a yearly rental of $20 million and a purchase outlay of $9 million."

★

"Next in the computer hierarchy are insurance companies and utilities, with 25 per cent of all installations. Another 25 per cent goes to manufacturing. Chemicals, food, petroleum and primary metals are cut-to-fit prospects—having the largest payroll, accounting and research jobs. The remaining computers find themselves in the service organizations and schools."

"With the exception of mass-volume utility accounting or insurance premium billing, no ONE application can carry the cost of a big computer. The price tag forbids such a luxury."

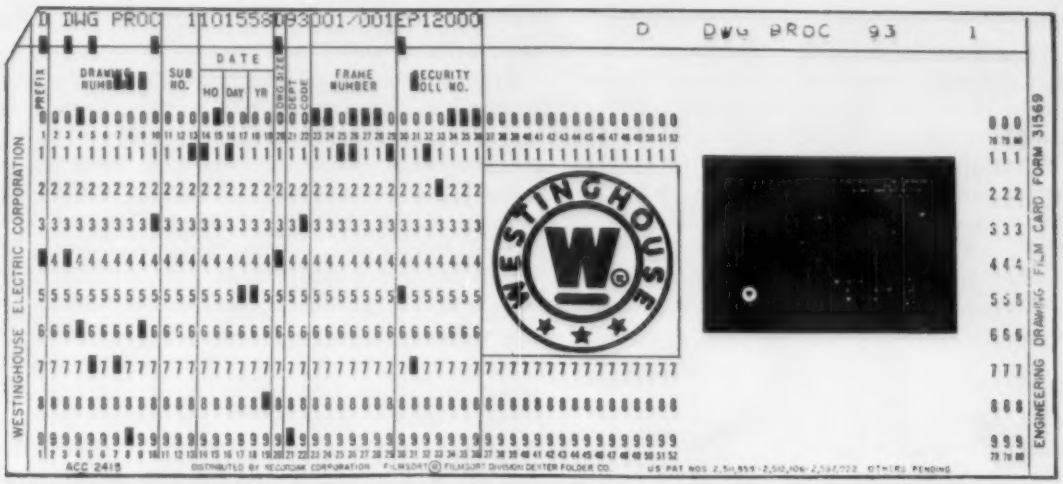
★

"More than half the users whose computers 'backfired' seem to have missed this lesson. Usually, they fell into a trap baited by that modern Lucifer called 'labor saving.' It is well known that management suffers from a glut of business paperwork and a hunger for productive workers. No one would deny that automation offers strong medicine for these ailments. And yet—of all reasons to buy a computer, labor saving is often the worst. The simple truth is that you cannot equate machine time with clerical effort. It usually takes far too many displaced clerks to amortize a computer."

★

"The false god of labor saving has two dark angels in attendance. One is called 'speed' and the other 'hardware.' They are close enough to be Siamese twins." ★

Kenneth C. Tiffany, Vice President, Burroughs Corp. made these remarks in a speech before the Federal Government Accountants Association's Eighth Annual Symposium in Washington, D.C.



Westinghouse's engineering drawing card has codes punched for automatic selection and filing, replaces "office" copy of drawing.

Westinghouse Continued

perature control. The East Pittsburgh Division has found it more efficient to utilize the twenty-four hour service of a commercial developing and printing company. As the film is going through the processing and developing stage, the list containing the necessary reference drawing codes is sent to the keypunch section where an aperture card is prepared. It is made from regular punched card stock with a window for mounting the film, and patented under the name of Filmsort. Reference information, including date and microfilm roll number, is punched into the card and also printed along the top edge of the card. A second card is duplicated for each drawing.

A view from a window

The processed film and the punched cards are brought together and the film mounted into the cards. Mounting is accomplished at a small compact viewer which allows the operator to see that the correct film is mounted on the proper punched card. The operation, though manual, is done at a speed of over thirty cards a minute. One film negative is mounted in the original card and the second negative in the duplicate card. The original cards are machine sorted by drawing number and then sent to the master files where they are hand interfiled. The master file is currently made up of about fifty thousand cards and is expected to increase to more than half-a-million by 1960. With such a volume it is much more efficient to add cards by hand rather than to attempt machine processing of the entire file.

Duplicate cards are sorted by product code and sent to the various engineering departments involved. These cards are used to replace the standard "office" copy of a drawing under the old system. The engineering departments are equipped with microfilm viewers, often called readers. When a draftsman wants to refer to a drawing he merely goes to the card file, selects the right card, and returns to his desk. By inserting the card into a viewer he has the drawing conveniently projected before him. Instead of having a large number of sheets of paper to shuffle back and forth, as he refers from one drawing to another, he merely has to remove a card and insert another into the viewer. Not each draftsman has his own viewer, but each section has enough viewers on mobile stands that they can be moved about to fit the needs of the entire group.

Each time a drawing is changed a new card replaces the old one. All files contain only the latest drawing information available. Requests for copies of drawings are received in the Reproduction Department in several ways. The two most common methods are by telephone and telautograph. The latter, often referred to as the "electronic pencil," is an electro-mechanical method of transmitting and reproducing handwritten requests between distant points. The pilot installation of these machines has met with considerable success and it appears that eventually a large number of them will be scattered throughout the shops and offices of the East Pittsburgh plant.

All requests for drawings are forwarded to the

master files where the proper cards are selected. As rapidly as a workable batch is accumulated it is sent to the Copyflo machines for reproduction. The Copyflo is an automatic xerographic high speed printer, made by Haloid Xerox Inc. It is capable of turning out top quality prints up to 24 inches wide, and of any length at the rate of twenty linear feet a minute. Of the two machines at Westinghouse, one will handle 12-inch-wide rolls of paper and the other, 24-inch-wide rolls. This paper can be standard weight paper or it can be offset master stock.

A five cent print

An outstanding feature of the Copyflo is its ability to print multiple copies of a given drawing. A repeat mechanism, activated by a dial, permits up to 400 prints from any one drawing card. Because of the optical projection system used to enlarge the microfilm Copyflo provides a built-in advantage not possible with the standard method of using the original tracings and black and white machines. The machine can produce reductions or enlargements of the original drawings with little variance of speed. Drawings can be conveniently reduced for inclusion in instruction manuals, installation prints, and other applications where a large size drawing would be inconvenient.

In operation the Copyflo machine is more complex than the standard black and white or blueprint machine. There is more room for individual discretion than there was on the standard machines where a single control, the setting of machine speed, was the only operator adjustment required. Because the job is less routine, the Copyflo operators at Westinghouse seem to take a greater interest in their work which results in top quality production.

"This solves all our paperwork problems."

Comparative costs obtained from the Westinghouse operation indicate that a 24 x 30 drawing reproduced on the Copyflo costs approximately 14 cents, as compared to 18 cents on the standard black and white machine. A far more substantial savings is possible when a copy of the aperture card is substituted for storing a full-sized print —the cost of duplicating a card is only five cents. With this savings in mind, the corporation encourages shop and office personnel to look at the duplicate cards on the viewer and request copies of drawings only when absolutely necessary. An educational program along this line has been very successful, and such departments as accounting and purchasing are finding the card and viewer method faster and easier than requesting an actual print of the drawing.

Success of the Westinghouse experience with automated drawings has led company officials to predict that in the not too distant future the aperture card will become so well accepted throughout industry that full-sized copies of engineering drawings will no longer be exchanged between customers, sub-contractors and other interested parties. According to Tom New, the aperture cards, with microfilm reductions of the drawings mounted on them, will be the accepted method of engineering communications as far as tracings are concerned. The day will probably come, says New, when government agencies will require that suppliers send copies of engineering drawings in the form of aperture cards.

Standards are set

The Westinghouse card is in agreement with the standards set by the various military organizations. With one such standard, drawings mounted on aperture cards could be freely exchanged between industry and government. New cites the potential savings resulting from industry being able to supply government with microfilm cards rather than the 15 to 20 copies of drawings which are now required. Additional savings, he points out, would result from reduction in folding, packaging and mailing costs.

Westinghouse has found the pioneer concept of "working" microfilm to be stimulating and highly profitable. Though the East Pittsburgh Division represents one of the country's larger industrial organizations, it must be emphasized that the advantages of "working" microfilm are available to small firms as well. The capital investment necessary to gain these advantages is in proportion to the activity and volume in a given operation. Proper equipment is available in a price range compatible to the small user. ■

Nine Ways Continued

Will you require special fireproof vaults for tape storage? Try to decide in advance how long you will store tapes and cards. The tendency is to keep these items too long, thus complicating storage problems. A tape storage vault may be a good investment. Your company possibly has an unused vault adjacent to the installation which may suffice.

Dust Control? Check this carefully. Get engineering advice and find someone who may have made a dust count in your area and already has the answer. Dust is inclined to gather under the raised floors. This must be removed before it circulates through the system.

There can be no pat answer as to how much housing will cost. Top-quality housing for automated departments is known to have run as high as $25 a square foot. In one department of approximately 2,500 square feet, the costs were slightly more than $62,500. Other installations have cost more. Costs depend upon condition of the building, amount of structural reinforcement needed, present wiring, climatic conditions, and many other factors.

Do not assume that just because you are moving into a modern skyscraper that everything will be ready, or that all needed facilities are available. Some of these buildings were not planned to accommodate present day, or future automation requirements. Take the attitude that your automation department will grow. Provide for expansion, which is almost certain to come sooner, and on a bigger scale than seems probable.

You will encounter recommendations which local contractors may doubt, simply because the specifications call for more accurate control, and more stand-by provisions than they have encountered in the past. When in doubt, or when a contractor with purely conventional equipment experience questions insistence upon certain specifications, consult the makers of your equipment. Their advice may save trouble in the future.

Keep uppermost in mind this thought: a few dollars spent in providing the right "climate" may save much larger sums in the future. As one firm reports, "In our automated equipment the slightest variation of input voltage will throw it out of kilter, a few degrees temperature change may expand or contract magnetic tape so it will not work."

Yes, the planning of a home for automation equipment requires expert assistance—men who have seen what actually happens when the big machines start whirring. Employ them, and let them steer you around the hazards which "guesswork" planning seldom sees in advance. ■

MBA'S Calendar Of Meetings

March 2-4 — Special Electronics Conference, American Management Association, Statler Hotel, New York.

March 2-6—Western Joint Computer Conference, Fairmont Hotel, San Francisco. Contact M. L. Lesser, IBM Research Laboratory, San Jose, Calif.

March 23-26—Office Management Association of Chicago Business Show, Conrad Hilton Hotel, Chicago. Contact William C. Dieden, chairman of the show, Chicago Federal Savings and Loan Association, 100 N. State St., Chicago.

April 21-24—12th Annual Southern California Business Show, Ambassador Hotel Convention Center, Los Angeles. Contact Publicity Chairman Edward P. Barrington, National Association of Accountants, 731 S. Spring St., Los Angeles.

June 15-20—First International Conference on Information Processing, Paris, France. Contact for U. S. committee, I. L. Auerbach, Auerbach Electronics Corp., 109 N. Essex, Narbeth, Pa.

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EDITORIALS

The Story Needs To Be Told

"GIVEN THE trends of recent years," says a top labor official, "the organization of non-blue-collar-workers takes on an almost life and death character for the American labor movement." He adds a blunt warning: "The labor movement must break out of its blue-collar shell and succeed in organizing the mass of white-collar workers."

We would like to add a warning of our own. It's time for management to lift its head from the sand and face this reality: the business office is the designated target for an all-out union attack. And what's worse, the man drawing the bead on the target is the same dubious gentleman that has thumbed his nose at every law enforcing body of the land—including the United States Senate. We refer of course to James Hoffa.

Like it or not, and we do not, Mr. Hoffa has designs on the office. He has cloaked the movement with the phony issue of "automation as a threat to job security." Phony as the issue and its creators may be, it will take more than name calling and rising blood pressures to dent their fifth-amendment armor.

We need an agressive pro-management selling job—a campaign of "truths" about business automation. It needs to be known that progressive management has used automation to make the workers' task easier and more efficient—not to replace them. We need to put an end, once and for all, to the myth that automation is a job destroying technique. And finally, we need to point out that automation is making a vital contribution to the economy and efficiency of millions of American business offices, and that the white-collar worker will share in the benefits of this contribution.

This story needs to be told. Tell it now—and it might effectively slam the office door right in the face of Mr. Hoffa and associates.

What's It Worth?

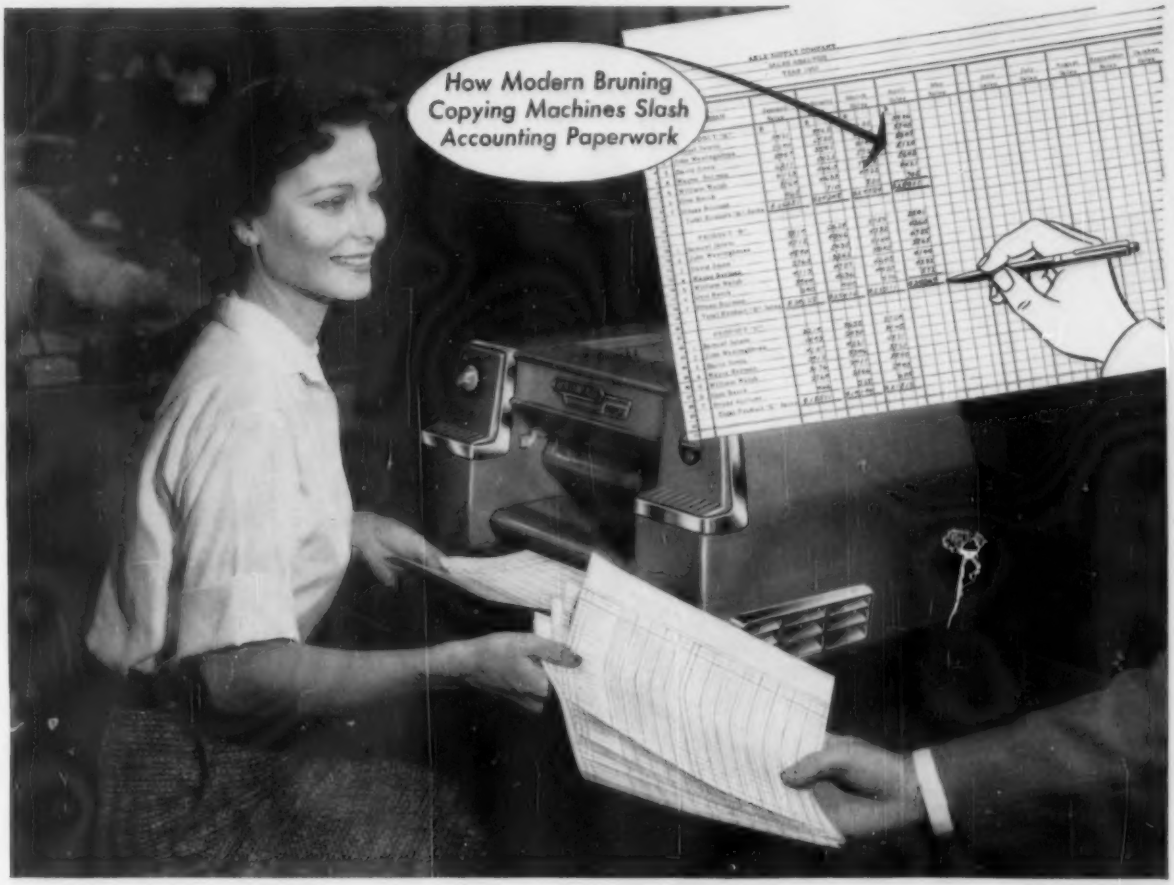
THE MAJOR stumbling block in the path of business automation is management's misunderstanding of the phrase itself.

In a study conducted for this magazine among executives responsible for data processing operations, there was a wide difference of opinion on the meaning of the very word "automation." Some correctly viewed automation as the substitution of automatic methods for human labor. An alarming number, however, took the stand that automation in some way must involve the application of electronic equipment.

Important as electronic equipment is to business automation, relying on it indiscriminately can be harmful to an organization searching anxiously for a way out of the paperwork jungle. The application of electronics, which denotes the use of vacuum tubes or transistor circuits, is only one of several equally important facets of automation. In some cases the use of such equipment can be far from the best solution to the problem at hand.

Business automation is simply the transfer of repetitive jobs now performed by people to mechanical, electric, electro-mechanical, or electronics methods. Some automation applications logically should entail a combination of all these methods. Some should use only relatively simple mechanical devices.

The important point is that a wealth of automatic methods for processing data are available to business management today. The advantage of these methods can no longer be questioned. Automation can be applied profitably in some way to virtually every business operation. The only thing left for management debate is the selection of the right method. A good philosophy here is not what it costs, but—how much is it worth?



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